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FORMULAS AND TABLES

FOR THE

CONSTRUCTION OF POLYCONIC PROJECTIONS

COMPILED BY
C. H. BIRDSEYE

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CONTENTS

ILLUSTRATIONS

PREFACE

The primary purpose of this publication is to provide tables for the construction of polyconic projections of topographic maps of standard quadrangles without any interpolation. Bulletin 650, "Geographic tables and formulas," gives many of the data needed, but the projection tables in that bulletin are incomplete, and many of them require difficult interpolation. The tables given herewith have been prepared with arguments for each meridian and parallel represented on maps of standard quadrangles, and the data are given in inches for each of the standard field scales employed by the Geological Survey. Tables in the same form have also been prepared for the two scales on which most of the quadrangle maps of the Geological Survey are published in final form—1:62,500, 1:125,000—and also for the scales 1:63,360, 1:20,000, 1:12,000, and 1:10,000. On account of lack of funds for printing, these tables have not been included in this publication, but it is hoped that they can be published at a later date.

A secondary purpose is to present in one publication all of the theory of the polyconic projection, with the formulas developed in detail and their use so explained that the engineer or cartographer with only an average knowledge of mathematics can understand and use them. Complete instructions are given for making polyconic projections of standard quadrangles by means of these tables.

The theory of the modified polyconic projection of the international map of the world is also explained, and tables for its construction are given with the data in meters on the natural scale as well as in inches on the scale of 1 : 1,000,000. For the first time these data have been computed for each degree of latitude.

The tables have been computed by members of the computing section of the United States Geological Survey, under the supervision of George T. Hawkins. The author is indebted to David H. Baldwin and Edward W. Tibbott, of the Geological Survey, and to Oscar Adams, of the United States Coast and Geodetic Survey, for valuable advice and critical review. Notices of errors and suggestions for improvement of the material are invited.

C. H. Birdseye,
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C. H. Birdseye,
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FORMULAS AND TABLES FOR THE CONSTRUCTION OF POLYCONIC PROJECTIONS

Compiled by C. H. Birdseye

GENERAL CONSIDERATIONS

Choice of a projection.—In mapping large areas the engineer is confronted with the problem of representing accurately on the plane surface of a map the details that exist on the earth's spherical surface. As it is impossible to do this exactly, he must resort to the use of some convention that will represent the earth's surface with the least distortion. The systematic drawing on a plane surface of lines that represent reference lines on the spherical surface of the earth is called a map projection. There are many systems of projection, each of which fulfills certain desirable conditions but none of which is ideal. The choice of the proper projection to use for a certain map is not always easy but depends largely on the extent of the area to be represented and on the use to which the map will be put. The best treatise on map projection published in English is United States Coast and Geodetic Survey Special Publication 68, "Elements of map projection."

Advantages and disadvantages of the polyconic projection.—The topographic engineer needs a projection which is simple in construction, which can be used to represent small areas on any part of the globe, and which, for each small area to which it is applied, preserves shapes, areas, distances, and azimuths in their true relation to the surface of the earth. For areas of small extent the polyconic projection meets all these needs, and it was adopted for the standard topographic map of the United States, in which the 1° quadrangle is the largest unit and the 15′ quadrangle is the average unit. Misuse of this projection in attempts to spread it over large areas—that is, to construct a single map of a large area—has developed serious errors and gross exaggeration of details. For example, the polyconic projection is not at all suitable for a single-sheet map of the United States or of a large State, although it has been so employed. Its greatest advantage lies in the facts that it has been computed for all latitudes of the entire spheroid and that it represents a small area on any part of the earth's surface just as well as one on any other part.

Characteristics of the polyconic projection.—The polyconic projection takes its name from the fact that it is based on the development of a large number of cones each conceived to be tangent to the spheroid at a parallel of latitude to be represented on the map. It has been computed for every minute of latitude from 0° to 90°, and existing tables make its construction very easy. It was devised by Ferdinand Hassler, the first superintendent of the United States Coast and Geodetic Survey, and has been computed by that bureau. The theory of the projection and tables for its construction are given in Coast and Geodetic Survey Special Publications 57 and 5.

In this projection a central meridian is drawn as a straight line, and the intersections of the parallels are spaced true to scale along this central meridian. Each parallel is then laid down separately by means of a cone whose base is tangent to the earth's surface at that parallel, with the vertex of the developed cone on the extension of the central meridian. The arcs of the parallels thus drawn are subdivided to true scale, and the meridians are drawn through these subdivisions. As a result the central meridian is shown as a straight line, and theoretically all other meridians are shown as curves. As the meridians and parallels nowhere intersect at right angles, except along the central meridian, and as all the other meridians are drawn as curves concave toward the central meridian, it is theoretically impossible to fit together in a row, east and west, two maps each of which is developed on its own central meridian, as their joining edges are curved in opposite directions. However, in practice and within certain limits this theoretical condition does not exist. It is impossible for a draftsman or an engraver to draw the limiting meridians of a 1° or smaller quadrangle within the latitudinal limits of the United States other than as straight lines. Moreover, as the projection is extended from the central meridian the length of the meridians is theoretically increased, but even in latitude 60° the difference in length between the line representing the limiting meridian of a 1° quadrangle and the line representing the central meridian is too small to be plotted, and the lengths of all the meridians on a projection of 1° or smaller may be assumed to be the same. Therefore, a row of maps east and west will join perfectly, although as the north edge of each map is shorter than the south edge the row will form a curve. A tier of maps north and south will also join with sufficient accuracy. Theoretically, there will be small gores between the edges of each east-west row of maps and the next row to the north or south, but in actual practice the distortion of map paper due to changes in atmospheric conditions is greater than the error of joining, so that by slightly stretching the outer tiers a moderate number of maps—say five or six each way—can be joined with approximately perfect accuracy. Seldom, if ever, will a map user

wish to join more than five or six quadrangle maps in any direction. The limits in the size of tables or wall space make further extension impracticable, and therefore the theoretical weaknesses of this projection can be ignored so far as maps of small quadrangles are concerned.

THEORY OF THE AMERICAN POLYCONIC PROJECTION

Clarke's spheroid.—The data in the following tables for the polyconic projection of maps are based on the dimensions of the spheroid determined by Col. A. R. Clarke, R. E., in 1866, as expressed by Clarke in meters but not as expressed by him in feet. Although the International Geophysical Union has adopted the Hayford spheroid as the most exactly determined representation of the size and shape of the earth, and the dimensions of the Hayford spheroid are now used in geophysical research, still the Clarke spheroid represents very closely the true size and shape of the earth, and most of the existing tables for the projection of maps are based on it. In the following tables the data are merely converted from measurements on the spheroid in meters, given in United States Coast and Geodetic Survey Special Publication 5, to inches on the several map scales employed by the United States Geological Survey. Some interpolation has been required in order to provide data for arguments for use in the construction of standard projections of 7½′ and 15′ quadrangles, such as latitude and longitude intervals of 1¼′, 2½′, 3¾′, and 7½′. Interpolation has also been employed in the conversion of the data, which may have resulted in errors of 0.001 inch in the tables, but one one-thousandth of an inch can not be plotted.

Tables are given for all the standard field scales employed by the Geological Survey for latitudes 0° to 51° or more. As the computation of special projections may be required, the fundamental formulas and demonstrations of their development are given with instructions for their use. The nomenclature employed in the formulas given in different publications on this subject differs, and in some demonstrations of the development of the formulas there may be some doubt as to the meaning of the symbols employed and some confusion in the use of mathematical expressions, such as an arc expressed in terms of the radius. An attempt has therefore been made to explain fully the meaning of each symbol or expression and to make the demonstrations and the instructions as to the use of the formulas so clear that a cartographer with only average knowledge of mathematics can follow them. In these demonstrations the following publications have been consulted freely and to some extent are quoted verbatim: United States Coast and Geodetic Survey Special Publications 5 and 57, Smithsonian Geographic Tables, and United States Geological Survey Bulletins 50 and 650.

Clarke expressed the dimensions of the spheroid in meters and also in English feet. According to him 1 meter = 39.370432 inches = 3.28086933 feet. The Smithsonian Geographic Tables and United States Geological Survey Bulletin 50, both prepared by R. S. Woodward, depend on the Clarke spheroid as expressed by him in feet. Some of the tables given in United States Geological Survey Bulletin 650 are extracts from the Smithsonian Geographic Tables and some are extracts from the United States Coast and Geodetic Survey tables. The polyconic projection tables computed by the United States Coast and Geodetic Survey depend on the dimensions of the spheroid as expressed by Clarke in meters, and the tables given herein depend on these dimensions and on the legal value in the United States of 1 meter = 39.37 inches = 3.28083333 feet. This figure does not express the absolutely correct relation between the international meter and the inch, but it is close enough for all practical purposes of map projection. Therefore, in order to reduce the dimensions of the spheroid as given by Clarke and Woodward in feet, and any tables of length based thereon, to corresponding values given in the United States Coast and Geodetic Survey Tables and those in this publication, it is necessary to multiply by the fraction $\frac{39.37}{39.370432} = 0.99998903$ (log. 9.99999523–10).

Constants of the generating ellipse.—The constants of the generating ellipse of a spheroid for which values are required in the computation of projection tables are defined as follows:

a = semimajor axis.
b = semiminor axis.
e = eccentricity.

$$n = \frac{a-b}{a+b} = \frac{1-\sqrt{1-e^2}}{1+\sqrt{1-e^2}}$$

The values of these constants with their logarithms for the Clarke spheroid of 1866 expressed in meters as used in computing the tables in this publication are:

a = 6,378,206.4 meters.	$\log a$ = 6.8046985690.
b = 6,356,583.8 meters.	$\log b$ = 6.8032237768.
e^2 = 0.0067686580.	$\log e^2$ = 7.8305025710–10.
n = 0.0016979157.	$\log n$ = 7.2299161198–10.

Radii of curvature.—The principal radii of curvature of an ellipsoid (see fig. 1) are

ρ_m = the radius of curvature of a meridional section.

ρ_n = the radius of curvature of a section normal to the meridian.

Both are constant for a given latitude, but for precise computations infinitely small sections of the circumference of the meridional ellipse must be considered, because meridional arcs cover a range of latitude,

and therefore ρ_m must be evaluated for infinitely small changes in latitude.

In Figure 1, let APP′D represent a quadrant of the generating ellipse; AQQ′B, a quadrant of the circumscribed circle; EFF′D, a quadrant of the inscribed circle; P and P′, two contiguous points on the ellipse at the ends of the infinitely small arc ds; PK and P′K $(=\rho_m)$, the normals at P and P′, or the radius of curvature of the infinitely small meridional arc ds; PK′ $(=\rho_n)$, the radius of curvature of a section normal to the meridian; OA $(=a)$, the semimajor axis; OD $(=b)$, the semiminor axis; the angle XRP $=\phi$, the latitude of the point P; and the angle XOQ $=\psi$, the geocentric latitude of the point P.

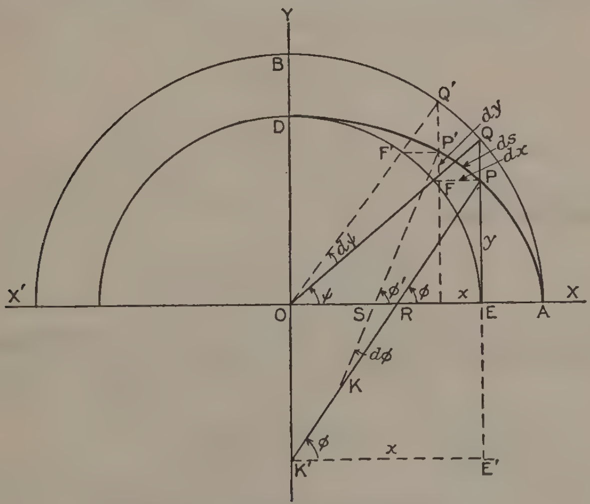

FIGURE 1.—Elements of generating ellipse

Expressing the coordinates of the point P in parametric form, we have

$$x = a \cos \psi$$

$$y = b \sin \psi$$

As the point moves from P to P′ the small changes in x and y are PF $(=-dx)$ and FP′ $(=dy)$, respectively. If the two equations are differentiated, ψ being regarded as a variable angle and x and y as functions of ψ, then

$$dx = -a \sin \psi \, d\psi$$

$$dy = \quad b \cos \psi \, d\psi$$

The triangles RPE and PP′F are similar and the angle PP′F = angle PRE $=\phi$, therefore

$$\tan \phi = \frac{-dx}{dy}.$$

Substituting the values of dx and dy, we have

$$\tan\phi=\frac{a\sin\psi}{b\cos\psi}=\frac{a}{b}\tan\psi$$

or

$$\tan\psi=\frac{b}{a}\tan\phi$$

The eccentricity of the ellipse, represented by e, is defined by the equation

$$e^2=\frac{a^2-b^2}{a^2}=1-\frac{b^2}{a^2}$$

or

$$\frac{b^2}{a^2}=1-e^2$$

and

$$\frac{b}{a}=\sqrt{1-e^2}$$

Substituting this value, we have

$$\tan\psi=\sqrt{1-e^2}\tan\phi$$

but

$$\sin\psi=\tan\psi\cos\psi=\frac{\tan\psi}{\sec\psi}=\frac{\tan\psi}{\sqrt{1+\tan^2\psi}}=\frac{\sqrt{1-e^2}\tan\phi}{\sqrt{1+\tan^2\phi-e^2\tan^2\phi}}=$$

$$\frac{\sqrt{1-e^2}\,\dfrac{\sin\phi}{\cos\phi}}{\sqrt{1+\dfrac{\sin^2\phi}{\cos^2\phi}-e^2\dfrac{\sin^2\phi}{\cos^2\phi}}}=\frac{\dfrac{\sqrt{1-e^2}\sin\phi}{\cos\phi}}{\dfrac{\sqrt{\cos^2\phi+\sin^2\phi-e^2\sin^2\phi}}{\cos\phi}}=\frac{\sqrt{1-e^2}\sin\phi}{\sqrt{1-e^2\sin^2\phi}}$$

and

$$\cos\psi=\frac{\sin\psi}{\tan\psi}=\frac{1}{\sqrt{1+\tan^2\psi}}=\frac{1}{\sqrt{1+\tan^2\phi-e^2\tan^2\phi}}=$$

$$\frac{1}{\sqrt{1+\dfrac{\sin^2\phi}{\cos^2\phi}-e^2\dfrac{\sin^2\phi}{\cos^2\phi}}}=\frac{1}{\dfrac{\sqrt{\cos^2\phi+\sin^2\phi-e^2\sin^2\phi}}{\cos\phi}}=\frac{\cos\phi}{\sqrt{1-e^2\sin^2\phi}}$$

Using the fundamental differential formula $d\tan x=\sec^2 x\,dx$, we have

$$\sec^2\psi\,d\psi=d\tan\psi$$

Substituting the value of $\tan\psi$ and differentiating, we have

$$\sec^2\psi\,d\psi=\sqrt{1-e^2}\sec^2\phi\,d\phi$$

or

$$d\psi = \frac{\sqrt{1-e^2}\sec^2\phi\, d\phi}{\sec^2\psi} = \sqrt{1-e^2}\sec^2\phi\, d\phi \cos^2\psi = \frac{\cos^2\phi\sqrt{1-e^2}\sec^2\phi\, d\phi}{1-e^2\sin^2\phi} =$$

$$\frac{\sqrt{1-e^2}\, d\phi}{1-e^2\sin^2\phi}$$

Let ds denote the infinitely small meridional arc PP′ of the generating ellipse; ρ_m = PK, the radius of curvature of the small arc; and $d\phi$ the angle PKP′, expressed in circular measure, through which the end of the radius moves in generating the small arc. Then considering the infinitely small arc of the ellipse as an arc of a circle and using the relation arc = radius times generating angle, we get

$$\rho_m\, d\phi = ds.$$

But

$$ds = \sqrt{\overline{dx}^2 + \overline{dy}^2} = \sqrt{a^2\sin^2\psi + b^2\cos^2\psi}\, d\psi =$$

$$\sqrt{a^2\sin^2\psi + a^2(1-e^2)\cos^2\psi}\, d\psi = a\sqrt{\sin^2\psi + \cos^2\psi - e^2\cos^2\psi}\, d\psi =$$

$$a\sqrt{1-e^2\cos^2\psi}\, d\psi$$

also

$$\sqrt{1-e^2\cos^2\psi} = \sqrt{1-e^2\left(\frac{\cos^2\phi}{1-e^2\sin^2\phi}\right)} = \sqrt{\frac{1-e^2\sin^2\phi - e^2\cos^2\phi}{1-e^2\sin^2\phi}} =$$

$$\sqrt{\frac{1-e^2(\sin^2\phi+\cos^2\phi)}{1-e^2\sin^2\phi}} = \frac{\sqrt{1-e^2}}{\sqrt{1-e^2\sin^2\phi}}$$

and

$$d\psi = \frac{\sqrt{1-e^2}\, d\phi}{1-e^2\sin^2\phi}$$

therefore

$$\sqrt{1-e^2\cos^2\psi}\, d\psi = \frac{(1-e^2)\, d\phi}{(1-e^2\sin^2\phi)^{\frac{3}{2}}}$$

and

$$ds = \frac{a(1-e^2)\, d\phi}{(1-e^2\sin^2\phi)^{\frac{3}{2}}}$$

but

$$\rho_m = \frac{ds}{d\phi}$$

therefore

$$\rho_m = \frac{a(1-e^2)}{(1-e^2\sin^2\phi)^{\frac{3}{2}}} \text{ - [I]}$$

If we pass a plane through any point P on the ellipsoid, parallel to the equatorial plane of the ellipsoid, this plane intersects the ellipsoid in a circle which represents the parallel at the point P, and the normals to the surface of the ellipsoid at every point on this

parallel circle intersect in a point K′ on the minor axis of the ellipsoid. If we pass a plane through the normals of any two contiguous points on the parallel circle and then let these normals approach each other until they coincide, we obtain a plane tangent to the given parallel and perpendicular to the meridian at the point of tangency. The radius of curvature in this plane corresponding to a small arc of the parallel is represented by PK′, because the normals of each point on the arc intersect at K′. If we denote this radius by ρ_n we have in the triangle PK′E′,

$$\cos\phi = \frac{x}{\rho_n}$$

Hence

$$\rho_n = \frac{x}{\cos\phi} = \frac{a\cos\psi}{\cos\phi} = \frac{\frac{a\cos\phi}{\sqrt{1-e^2\sin^2\phi}}}{\cos\phi} = \frac{a}{(1-e^2\sin^2\phi)^{\frac{1}{2}}} \text{------[II]}$$

It is evident that ρ_n is always greater than ρ_m except when $\phi = \pm 90°$; in that event $\rho_n = \rho_m$.

Logarithms of ρ_m and ρ_n in English feet are given in the Smithsonian Geographic Tables for each minute from 0° to 90° and in Geological Survey Bulletin 50 for each minute from 21° to 51°; to reduce these logarithms to logarithms of the radii expressed in American feet to correspond to the relation with the legal value of the meter in the United States, 47.7 in the last (7th) place must be subtracted. To reduce logarithms of American feet to logarithms of meters (United States legal value) the logarithm 9.48401583–10 should be added. Consequently the logarithms given in the Smithsonian Geographic Tables or in Geological Survey Bulletin 50 may be used for computations of formulas and tables given in the present publication by adding the logarithm 9.48401106–10.

However, in connection with geodetic computations the Coast and Geodetic Survey has adopted several factors based on the Clarke spheroid as expressed in meters (United States legal value), and it is more convenient to use two of these factors, log A and log B, than to use the values of ρ_m and ρ_n given in the Smithsonian Geographic Tables. The logarithms of these factors have been computed to the seventh place for each minute from 0° to 72° and are given in Geological Survey Bulletin 650 and in Coast and Geodetic Survey Special Publication 8. These factors are

$$A = \frac{(1-e^2\sin^2\phi)^{\frac{1}{2}}}{a \text{ arc } 1''}$$

$$B = \frac{(1-e^2\sin^2\phi)^{\frac{3}{2}}}{a(1-e^2) \text{ arc } 1''}$$

Introducing these factors into the formulas for ρ_m and ρ_n given above, we have

$$\rho_m = \frac{1}{B \text{ arc } 1''} \qquad \text{[III]}$$

$$\rho_n = \frac{1}{A \text{ arc } 1''} \qquad \text{[IV]}$$

In these factors arc 1″ is expressed in radians [1] and is 0.0000048481368 log arc 1″ = 4.6855748668–10, which is the same as log sin 1″ to the tenth decimal place.

Meridional arcs.—The length of an arc of a circle equals the length of its radius times the length of the arc expressed in radians. If a very short section of a meridional ellipse is considered as an arc of a circle, the length of this short section can be found by the use of simple formulas with sufficient exactness for use in ordinary large-scale map projections. But if it is desired to find the length of a long arc or to determine exactly the length of a short arc, it is necessary to take the summation of the lengths of the infinitely small arcs making up the arc whose length is desired, by the process of integrating between the limiting parallels the variable lengths of the small arcs corresponding to infinitely small uniform subdivisions of the difference of latitude.

The length of a short meridional arc lying between two given parallels of latitude can be computed by the simple formulas given below, in which

ϕ_1 and ϕ_2 are the latitudes, expressed in degrees, minutes, and seconds, of the ends of the arc.

$\phi = \frac{1}{2}(\phi_1 + \phi_2)$ and is the mean latitude of the arc.

$\Delta\phi = \phi_2 - \phi_1$ and is here taken as the length of the arc expressed in radians.

$\Delta\phi' = \phi_2 - \phi$ and is here taken as the length of the arc expressed in minutes.

Arc 1′ = 0.0002908882 radian, or the length of an arc of 1′ for a unit radius.

ΔM is the required length of the arc, or the meridional distance expressed in meters. Then, as the length of the arc equals the length of the radius times the arc expressed in radians,

$$\Delta M = \rho_m \Delta\phi = \rho_m \text{ arc } 1' \; \Delta\phi'$$

But

$$\rho_m = \frac{1}{B \text{ arc } 1''}$$

[1] A radian is an arc of a circle equal to its radius and is a unit arc in circular measure. Its value in degrees is $\frac{360}{2\pi}$, which equals 57°.29577951 or 3437′.746771 or 206264″.80625.

therefore

$$\Delta M = \frac{\text{arc } 1'\Delta\phi'}{\text{arc } 1''B} = \frac{60\Delta\phi'}{B} \text{ -------------------- [V]}$$

Log 60 = 1.7781513. Log B for the mean latitude ϕ is given for each minute of latitude in Table 28, Geological Survey Bulletin 650, and in Coast and Geodetic Survey Special Publication 8. The approximate formula for ΔM should not be used for arcs of the meridian longer than 1°. The error will depend on the latitude but for 1° will be approximately +0.8 meter, for 30′ about +0.4 meter, for 15′ about +0.2 meter, and for 7½′ about +0.1 meter. The latitude, the scale, and the size of the projection will control largely the selection of formulas.

For the computation of the length of a long meridional arc or the precise computation of a short arc, a formula must be used which will give the sum of the varying lengths corresponding to infinitely small subdivisions of the difference of latitude. In other words, the approximate formula $\Delta M = \rho_m \Delta\phi$ must be integrated between the limits of the latitudes of the ends of the arc. The expression will be integrated first in general form between latitude 0° and any latitude ϕ.

$d\phi$ = an infinitely small difference in latitude, or the differential of the latitude.

M = the length of the arc in meters, from the Equator to latitude ϕ. Using the value of ρ_m given in [I], we have

$$M = \int_0^{\phi} \frac{a(1-e^2)\,d\phi}{(1-e^2\sin^2\phi)^{\frac{3}{2}}}$$

Expanding the binomial reciprocal of the denominator, we have

$$(1-e^2\sin^2\phi)^{-\frac{3}{2}} = 1 + \frac{3}{2}e^2\sin^2\phi + \frac{15}{8}e^4\sin^4\phi + \frac{35}{16}e^6\sin^6\phi + \frac{315}{128}e^8\sin^8\phi + \cdots\cdots$$

But,

$$\sin^2\phi = \frac{1}{2}(1-\cos 2\phi) = \frac{1}{2} - \frac{1}{2}\cos 2\phi$$

$$\sin^4\phi = \frac{3}{8} - \frac{1}{2}\cos 2\phi + \frac{1}{8}\cos 4\phi$$

$$\sin^6\phi = \frac{5}{16} - \frac{15}{32}\cos 2\phi + \frac{3}{16}\cos 4\phi - \frac{1}{32}\cos 6\phi$$

$$\sin^8\phi = \frac{35}{128} - \frac{7}{16}\cos 2\phi + \frac{7}{32}\cos 4\phi - \frac{1}{16}\cos 6\phi + \frac{1}{128}\cos 8\phi$$

Substituting these values and arranging the terms as constants and as coefficients of cos 2ϕ, cos 4ϕ, etc., we have

$$(1-e^2\sin^2\phi)^{-\frac{3}{2}}=\overbrace{\left(1+\frac{3}{4}e^2+\frac{45}{64}e^4+\frac{175}{256}e^6+\frac{11025}{16384}e^8+\cdots\right)}^{A}$$

$$-\overbrace{\left(\frac{3}{4}e^2+\frac{15}{16}e^4+\frac{525}{512}e^6+\frac{2205}{2048}e^8+\cdots\right)}^{B}\cos 2\phi$$

$$+\overbrace{\left(\frac{15}{64}e^4+\frac{105}{256}e^6+\frac{2205}{4096}e^8+\cdots\cdot\right)}^{C}\cos 4\phi$$

$$-\overbrace{\left(\frac{315}{512}e^6+\frac{315}{2048}e^8+\cdots\cdot\right)}^{D}\cos 6\phi$$

$$+\overbrace{\left(\frac{315}{16384}e^8+\cdots\right)}^{E}\cos 8\phi$$

$$-(\cdot\cdot\cdot\cdot\cdot)$$

Then

$$M=\int_0^\phi a(1-e^2)\left[A-B\cos 2\phi+C\cos 4\phi-D\cos 6\phi+E\cos 8\phi-\cdots\cdot\right]d\phi$$

But

$$\int m\,dx=mx+k \text{ and } \int m\cos nx\,dx=\frac{m}{n}\sin nx+k$$

fundamental formulas in which
m is a definite coefficient
x is a variable quantity
n is a coefficient of the variable
k is a constant.

Therefore

$$\int a(1-e^2)\,A\,d\phi=a(1-e^2)\,A\phi+k$$

$$\int a(1-e^2)\,B\cos 2\phi\,d\phi=a(1-e^2)\,B\frac{1}{2}\sin 2\phi+k$$

$$\int a(1-e^2)\,C\cos 4\phi\,d\phi=a(1-e^2)\,C\frac{1}{4}\sin 4\phi+k$$

$$\int a(1-e^2)\,D\cos 6\phi\,d\phi=a(1-e^2)\,D\frac{1}{6}\sin 6\phi+k$$

$$\int a(1-e^2)\,E\cos 8\phi\,d\phi=a(1-e^2)\,E\frac{1}{8}\sin 8\phi+k.$$

The value of M between the limits 0° and ϕ° is the difference between the integrals when $\phi=\phi°$ and when $\phi=0°$. If $\phi=0°$, then $\sin 2\phi$, $\sin 4\phi$, etc., $=0$, and the integral of each of the five terms given above is equal to k. In the subtraction of integrals all the k's cancel. Therefore,

$$M=a(1-e^2)\left[A\phi-\frac{1}{2}B\sin 2\phi+\frac{1}{4}C\sin 4\phi-\frac{1}{6}D\sin 6\phi\right.$$
$$\left.+\frac{1}{8}E\sin 8\phi-\cdots\cdot\right]$$

Substituting the values of A, B, C, D, and E, we get

$$M=a(1-e^2)\left[\left(1+\frac{3}{4}e^2+\frac{45}{64}e^4+\frac{175}{256}e^6+\frac{11025}{16384}e^8+\cdots\cdot\right)\phi\right.$$
$$-\frac{1}{2}\left(\frac{3}{4}e^2+\frac{15}{16}e^4+\frac{525}{512}e^6+\frac{2205}{2048}e^8+\cdots\right)\sin 2\phi$$
$$+\frac{1}{4}\left(\frac{15}{64}e^4+\frac{105}{256}e^6+\frac{2205}{4096}e^8+\cdots\right)\sin 4\phi$$
$$-\frac{1}{6}\left(\frac{35}{512}e^6+\frac{315}{2048}e^8+\cdots\cdot\right)\sin 6\phi$$
$$+\frac{1}{8}\left(\frac{315}{16384}e^8+\cdots\cdot\right)\sin 8\phi$$
$$\left.-\cdots\cdots\right]$$

Let

$$A_0=a(1-e^2)\left(1+\frac{3}{4}e^2+\frac{45}{64}e^4+\frac{175}{256}e^6+\frac{11025}{16384}e^8+\cdots\right)$$
$$=6{,}367{,}399.6891 \text{ meters.}$$

$$A_2=a(1-e^2)\left(\frac{3}{4}c^2+\frac{15}{16}e^4+\frac{525}{512}e^6+\frac{2205}{2048}e^8+\cdots\right)$$
$$=32{,}433.8882 \text{ meters.}$$

$$A_4=\frac{1}{2}a(1-e^2)\left(\frac{15}{64}e^4+\frac{105}{256}e^6+\frac{2205}{4096}e^8+\cdots\cdot\right)=34.4187 \text{ meters.}$$

$$A_6=\frac{1}{3}a(1-e^2)\left(\frac{35}{512}e^6+\frac{315}{2048}e^8+\cdots\cdot\right)=0.0454 \text{ meters.}$$

$$A_8=\frac{1}{4}a(1-e^2)\left(\frac{315}{16384}e^8+\cdots\cdot\right)=0.00006 \text{ meters.}$$

Then

$$M=A_0\phi-\frac{1}{2}A_2\sin 2\phi+\frac{1}{2}A_4\sin 4\phi-\frac{1}{2}A_6\sin 6\phi+\frac{1}{2}A_8\sin 8\phi-\cdots \quad \text{[VI]}$$

This expression, in which ϕ is expressed in radians, gives the length of the arc of the meridian (in meters, if a is taken in meters) from the

Equator to the parallel at latitude ϕ. The length of the arc of the meridian represented by the difference between two values of ϕ is found by taking the difference in the values of M for the two latitudes.

Let M_2 = length of the arc of the meridian from the Equator to latitude ϕ_2.

M_1 = length of the arc of the meridian from the Equator to latitude ϕ_1.

$\Delta M = M_2 - M_1$ = length of the arc between latitudes ϕ_1 and ϕ_2.

$\phi = \frac{1}{2}(\phi_2 + \phi_1)$ = mean latitude of the arc.

$\Delta\phi = \phi_2 - \phi_1$

Then

$$\Delta M = A_0(\phi_2 - \phi_1) - \frac{1}{2}A_2(\sin 2\phi_2 - \sin 2\phi_1) + \frac{1}{2}A_4(\sin 4\phi_2 - \sin 4\phi_1)$$
$$- \frac{1}{2}A_6(\sin 6\phi_2 - \sin 6\phi_1) + \frac{1}{2}A_8(\sin 8\phi_2 - \sin 8\phi_1) - \cdots$$

But

$$\sin \alpha - \sin \beta = 2 \cos \frac{1}{2}(\alpha + \beta) \sin \frac{1}{2}(\alpha - \beta)$$

Substituting

$2\phi_2$, $4\phi_2$, etc., for α and $2\phi_1$, $4\phi_1$, etc., for β, we have

$$\Delta M = A_0(\phi_2 - \phi_1) - \frac{1}{2}A_2\left[2 \cos \frac{1}{2}(2\phi_2 + 2\phi_1) \sin \frac{1}{2}(2\phi_2 - 2\phi_1)\right]$$
$$+ \frac{1}{2}A_4\left[2 \cos \frac{1}{2}(4\phi_2 + 4\phi_1) \sin \frac{1}{2}(4\phi_2 - 4\phi_1)\right]$$
$$- \frac{1}{2}A_6\left[2 \cos \frac{1}{2}(6\phi_2 + 6\phi_1) \sin \frac{1}{2}(6\phi_2 - 6\phi_1)\right]$$
$$+ \frac{1}{2}A_8\left[2 \cos \frac{1}{2}(8\phi_2 + 8\phi_1) \sin \frac{1}{2}(8\phi_2 - 8\phi_1)\right]$$

But,

$$\frac{1}{2}(2\phi_2 + 2\phi_1) = 2\phi, \quad \frac{1}{2}(4\phi_2 + 4\phi_1) = 4\phi, \text{ etc.}$$

and

$$\frac{1}{2}(2\phi_2 - 2\phi_1) = \Delta\phi, \quad \frac{1}{2}(4\phi_2 - 4\phi_1) = 2\,\Delta\phi, \text{ etc.}$$

therefore

$$\Delta M = A_0\Delta\phi - A_2 \cos 2\phi \sin \Delta\phi + A_4 \cos 4\phi \sin 2\Delta\phi$$
$$- A_6 \cos 6\phi \sin 3\Delta\phi + A_8 \cos 8\phi \sin 4\,\Delta\phi - \cdots \qquad \text{[VII]}$$

In the first term of the formula given above, $\Delta\phi$ is expressed in radians, and the value of A_0 is 6,367,399.6891 meters. If it is desired to use

the formula with $\Delta\phi$ expressed in degrees, minutes, or seconds, values of A_0 must be taken as follows:

$$A^{\circ}_0=\frac{2\pi}{360}A_0=111{,}132.0894 \text{ meters} \qquad \log=5.0458394793$$

$$A'_0=\frac{2\pi}{21600}A_0=1{,}852.2015 \text{ meters} \qquad \log=3.2676882316$$

$$A''_0=\frac{2\pi}{1296000}A_0=30.8700 \text{ meters} \qquad \log=1.4895366$$

In computing lengths of arcs of the meridian for the projection tables given in this publication, in which the arcs are taken in terms of minutes, the following formula should be used, the last term containing A_8 being dropped:

$$\Delta M=1{,}852.2015\Delta\phi'-32{,}433.8882 \cos 2\phi \sin \Delta\phi+34.4187 \cos 4\phi \sin 2\Delta\phi$$
$$-0.0454 \cos 6\phi \sin 3\Delta\phi+\cdot\cdot\cdot\cdot\cdot \text{------------------} [\text{VIII}]$$

$$\log\ 1{,}852.2015=3.2676882316$$
$$32{,}433.8882=4.5109990154$$
$$34.4187=1.5367944629$$
$$0.0454=8.6570559-10$$

Arcs of the parallel.—For computations of the length of the arc of the parallel lying between two given meridians of longitude the formulas given below may be used, in which—

ϕ is the latitude of the parallel, expressed in degrees, minutes, and seconds.

r is the length of the radius of the parallel, expressed in meters.

ρ_n is the length of the radius of curvature of the section normal to the meridian, expressed in meters.

λ_1 and λ_2 are the longitudes of the ends of the arc, expressed in degrees, minutes, and seconds.

$\Delta\lambda=\lambda_2-\lambda_1$ and is the arc of the parallel expressed in degrees or minutes or seconds, the unit depending on the formula used. If fractional parts of degrees or minutes or seconds are required they must be expressed decimally.

ΔP is the required length of the arc expressed in meters.

The radius of any parallel is equal to the product of the radius of curvature of the normal section for the same latitude by the cosine of that latitude, as is seen in Figure 2 in the triangle PK′M, in which $\cos\phi=\frac{r}{\rho_n}$. Therefore

$$r=\rho_n \cos \phi$$

and the entire length of the parallel is

$$2\pi r=2\pi\rho_n \cos \phi$$

Any arc of the parallel is equal to the entire length of the parallel divided by the number of units in the circumference and multiplied by the number of the same units in the arc. Therefore

$$\Delta P = \frac{2\pi\rho_n \cos\phi}{360} \ (\Delta\lambda \text{ in degrees})$$

But

$$\rho_n = \frac{1}{A \text{ arc } 1''}$$

therefore

$$\Delta P = \left(\frac{2\pi}{360 \text{ arc } 1''}\right)\left(\frac{\cos\phi}{A}\right)(\Delta\lambda \text{ in degrees})$$

$$= \left(\frac{20\pi}{\text{arc } 1^\circ}\right)\left(\frac{\cos\phi}{A}\right)(\Delta\lambda \text{ in degrees})$$

But

$$\text{arc } 1^\circ = \frac{\pi}{180} \cdot \text{ and } \frac{20\pi}{\text{arc } 1^\circ} = \frac{20\pi}{\frac{\pi}{180}} = 3600$$

therefore

$$\left.\begin{aligned} \Delta P \text{ (meters)} &= 3600 \frac{\cos\phi}{A} \Delta\lambda \text{ (degrees)} \\ &= 60 \frac{\cos\phi}{A} \Delta\lambda \text{ (minutes)} \\ &= \frac{\cos\phi}{A} \Delta\lambda \text{ (seconds)} \end{aligned}\right\} \text{-----------[IX]}$$

Rectangular coordinates.—In the polyconic system of map projection each parallel of latitude represented on the map appears as the developed circumference of the base of a right cone tangent to the spheroid along that parallel. Thus the parallel PN (fig. 2) and the arc P_1P_2 (fig. 3) will appear in projection as the arc of a circle PP_1P_2N (fig. 4) whose radius $GP_1 = l$ is equal to the slant height of the tangent cone PGN (fig. 2).

In constructing a map projection on this system the meridians and parallels are usually delineated by plotting and joining their points of intersection. The coordinates of these points may be expressed in the following manner (see figs. 3 and 4): For any parallel, as PP_1P_2N, take the origin P_1 at the intersection with the central meridian and let the rectangular axes of $Y(P_1G)$ and of $X(P_1Q)$ be respectively coincident with and perpendicular to this meridian.

Let $\Delta\lambda$ represent the difference of longitude between the central meridian and the next adjacent one; $\Delta P = P_1P_2$ the arc of the parallel between the central meridian and the next adjacent one; θ the angle

at the apex of the developed tangent cone between the central meridian and the next adjacent one; ϕ the latitude of the parallel, which is also the angle at the apex of the tangent cone between a meridional element of the surface of the cone and its axis; l the slant height of the tangent cone and the radius of the developed parallel; r the radius of the parallel in the plane of the parallel; and ρ_n the radius of curvature at P_1 of the cross section of the ellipsoid through the point P_1 normal to the central meridian.

Then from Figure 4, in the triangle GP_2S, it is apparent that

$$x = l \sin \theta$$

and in the triangle P_1P_2S that

$$y = x \tan \frac{\theta}{2}$$

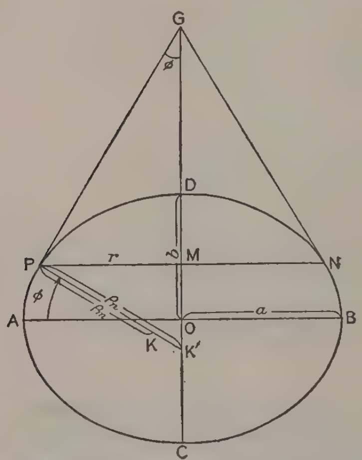

FIGURE 2.—Elements of ellipsoid and tangent cone

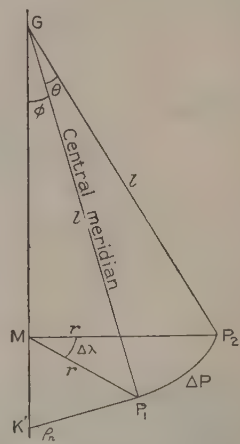

FIGURE 3.—Sector of tangent cone

Substituting the value of x and remembering that $\sin \theta = 2 \sin \frac{\theta}{2} \cos \frac{\theta}{2}$, we have

$$y = 2\, l \sin^2 \frac{\theta}{2}$$

From Figure 3, in the triangle GP_1K', it is apparent that

$$l = \rho_n \cot \phi$$

The length of the arc ΔP (fig. 3) is measured by the length of the radius r of the parallel times the central angle $\Delta\lambda$ (in radians), and the same arc is also measured by the length l of the radius of the developed cone times the angle θ (in radians); therefore

$$l\theta = r\Delta\lambda$$

But from Figure 3, in the triangle $P_1K'M$, it is apparent that $r = \rho_n \cos \phi$; therefore

$$\theta = \frac{\rho_n \Delta\lambda \cos \phi}{l}$$

Substituting in this the value of l given above, we have

$$\theta = \Delta\lambda \sin \phi$$

Then, substituting in the expressions for x and y the values of l and θ, we have

$$x = \rho_n \cot \phi \sin (\Delta\lambda \sin \phi) = \frac{\cot \phi \sin (\Delta\lambda \sin \phi)}{A \text{ arc } 1''} \text{-------[X]}$$

$$y = 2\rho_n \cot \phi \sin^2 \frac{1}{2} (\Delta\lambda \sin \phi) = \frac{2 \cot \phi \sin^2 \frac{1}{2} (\Delta\lambda \sin \phi)}{A \text{ arc } 1''} \text{--[XI]}$$

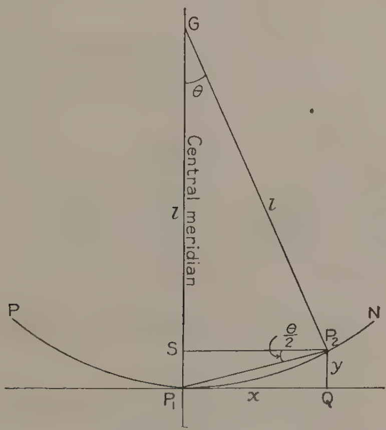

FIGURE 4.—Developed cone

In the two formulas given above the expression $\Delta\lambda \sin \phi$ is approximately the convergence of the meridian, and it will give an angle in the same units as are used for $\Delta\lambda$. For example, if $\Delta\lambda$ is taken in radians, degrees, or minutes the angle $(\Delta\lambda \sin \phi)$ will be in radians, degrees, or minutes, respectively. The expression $\sin \phi$ is really a coefficient of $\Delta\lambda$ just as if it were a quantity like 2 or 4.

Log A is given for each minute of latitude from 0° to 72° in Table 28, Geological Survey Bulletin 650, and in Coast and Geodetic Survey Special Publication 8.

Log arc $1'' = 4.6855749-10$.

The formulas for x and y given above are exact expressions of the coordinates of the point P. But when $\Delta\lambda$ is small substitution for the quantities $\sin (\Delta\lambda \sin \phi)$ and $\sin^2 \frac{1}{2} (\Delta\lambda \sin \phi)$ of the first two

terms of their expansions will yield formulas more convenient to use and at the same time give satisfactory results. These expressions are

$$\sin(\Delta\lambda \sin\phi) = \Delta\lambda \sin\phi - \frac{1}{6}(\Delta\lambda \sin\phi)^3 + \cdots\cdots$$

$$\sin^2 \frac{1}{2}(\Delta\lambda \sin\phi) = \frac{1}{4}(\Delta\lambda \sin\phi)^2 - \frac{1}{48}(\Delta\lambda \sin\phi)^4 + \cdots\cdots$$

Substituting these values in the formulas for x and y, we have

$$x = \rho_n \cot\phi\ \Delta\lambda \sin\phi - \frac{1}{6}\rho_n \cot\phi\,(\Delta\lambda \sin\phi)^3 + \cdots\cdots$$

But $\cot\phi \sin\phi = \cos\phi$; therefore

$$x = \rho_n \Delta\lambda \cos\phi - \frac{1}{6}\rho_n \Delta\lambda \cos\phi\,(\Delta\lambda \sin\phi)^2 + \cdots\cdots$$

or

$$x = \rho_n \Delta\lambda \cos\phi \left[1 - \frac{1}{6}(\Delta\lambda \sin\phi)^2 + \cdots\cdots\right]$$

But

$$\rho_n = \frac{1}{A \text{ arc } 1''}$$

therefore

$$x = \frac{\Delta\lambda \cos\phi}{A \text{ arc } 1''}\left[1 - \frac{1}{6}(\Delta\lambda \sin\phi)^2 + \cdots\cdots\right] \text{---------[XII]}$$

also

$$y = 2\rho_n \cot\phi \frac{1}{4}(\Delta\lambda \sin\phi)^2 - 2\rho_n \cot\phi \frac{1}{48}(\Delta\lambda \sin\phi)^4 + \cdots\cdots$$

$$= \frac{1}{2}\rho_n \Delta\lambda^2 \sin\phi \cos\phi - \frac{1}{24}\rho_n \Delta\lambda^2 \sin\phi \cos\phi\,(\Delta\lambda \sin\phi)^2 + \cdots$$

$$= \frac{1}{2}\rho_n \Delta\lambda^2 \sin\phi \cos\phi \left[1 - \frac{1}{12}(\Delta\lambda \sin\phi)^2 + \cdots\cdots\right]$$

But

$$\sin\phi \cos\phi = \frac{1}{2}\sin 2\phi \text{ and } \rho_n = \frac{1}{A \text{ arc } 1''}$$

therefore

$$y = \frac{\Delta\lambda^2 \sin 2\phi}{4A \text{ arc } 1''}\left[1 - \frac{1}{12}(\Delta\lambda \sin\phi)^2 + \cdots\cdots\right] \text{------[XIII]}$$

In these two formulas for x and y $\Delta\lambda$ is expressed in radians. $\Delta\lambda$ may be taken in seconds, minutes, or degrees by using the following relations:

$$\Delta\lambda^r = \Delta\lambda'' \text{ arc } 1''$$

$$\Delta\lambda^r = \Delta\lambda' \text{ arc } 1' = 60\ \Delta\lambda' \text{ arc } 1''$$

$$\Delta\lambda^r = \Delta\lambda^\circ \text{ arc } 1^\circ = 3600\ \Delta\lambda^\circ \text{ arc } 1''$$

and the formulas may be written as follows by substituting in the coefficient the proper value of $\Delta\lambda$ expressed in terms of arc 1″, so as to cancel the term arc 1″ in the denominator, and by substituting in the series the proper value of $\Delta\lambda$ expressed in terms of arc 1″, arc 1′, or arc°, as the case may require:

$$\left.\begin{aligned} x&=\frac{\Delta\lambda'' \cos \phi}{A}\left[1-\frac{1}{6}(\Delta\lambda'' \text{ arc } 1'' \sin \phi)^2+\cdots\right] \\ y&=\frac{(\Delta\lambda'')^2 \text{arc } 1'' \sin 2\phi}{4A}\left[1-\frac{1}{12}(\Delta\lambda'' \text{arc } 1'' \sin \phi)^2+\cdots\right] \end{aligned}\right\} \begin{matrix}\Delta\lambda \text{ in} \\ \text{seconds}\end{matrix} \quad [\text{XIV}]$$

$$\left.\begin{aligned} x&=\frac{60\Delta\lambda' \cos \phi}{A}\left[1-\frac{1}{6}(\Delta\lambda' \text{arc } 1' \sin \phi)^2+\cdots\right] \\ y&=\frac{15(\Delta\lambda')^2 \text{arc } 1' \sin 2\phi}{A}\left[1-\frac{1}{12}(\Delta\lambda' \text{arc } 1' \sin \phi)^2+\cdots\right] \end{aligned}\right\} \begin{matrix}\Delta\lambda \text{ in} \\ \text{minutes}\end{matrix} \quad [\text{XV}]$$

$$\left.\begin{aligned} x&=\frac{3600\Delta\lambda^\circ \cos \phi}{A}\left[1-\frac{1}{6}(\Delta\lambda^\circ \text{arc } 1^\circ \sin \phi)^2+\cdots\right] \\ y&=\frac{900(\Delta\lambda^\circ)^2 \text{arc } 1^\circ \sin 2\phi}{A}\left[1-\frac{1}{12}(\Delta\lambda^\circ \text{arc } 1^\circ \sin \phi)^2+\cdots\right] \end{aligned}\right\} \begin{matrix}\Delta\lambda \text{ in} \\ \text{degrees}\end{matrix} \quad [\text{XVI}]$$

The constants in these formulas with their logarithms are as follows:

arc 1″ = 0.0000048481 radian	log = 4.6855749 − 10
arc 1′ = 0.0002908882 radian	log = 6.4637262 − 10
arc 1° = 0.0174532925 radian	log = 8.2418774 − 10

This group of formulas seems more complex than the formulas for x and y given in X and XI, but the terms are so arranged that their use will be found more convenient in making a large number of computations, especially if the terms within the brackets can be dropped.

Analysis of formulas.—Analysis of the last group of formulas for x will show that for values of $\Delta\lambda$ of 1° or less and for latitudes of 60° or less the terms within the brackets can be disregarded with a resulting maximum error of +2.2 meters in the abscissa of the developed parallel. The ordinate of the developed parallel of 45° has the greatest value for the same value of $\Delta\lambda$, and for values of $\Delta\lambda$ of 1° or less the terms within the brackets in the formulas for y can be disregarded with a resulting maximum error of +0.007 meter. The following table gives an idea of the errors in the values of x and y resulting from the use of the first term only of these formulas:

Value of Δλ	Latitude 25°				Latitude 50°			
	60′	30′	15′	7½′	60′	30′	15′	7½′
Errors in x, in meters	+0.915	+0.114	+0.014	+0.002	+2.121	+0.267	+0.033	+0.004
Errors in y, in meters	+.0017	+.0001	+.0000	+.0000	+.0071	+.0004	+.0000	+.0000

Even the maximum error of 2.2 meters on the spheroid can not be plotted on any ordinary map projection; consequently where $\Delta\lambda$ does not exceed 60 minutes it is sufficient to use only the first term in the bracket in any one of the last group of formulas for x and y.

Analysis of the formula for ΔP and of the rigid formula for x shows that for short arcs of the parallel of 30′ or less and for latitudes of 50° or less there is very little difference between the actual lengths of the arcs of the parallels and the abscissas of their development, and that either formula may be used for the other. The following table gives an idea of these differences:

Value of $\Delta\lambda$	Latitude 25°			Latitude 50°		
	30′	15′	7½′	30′	15′	7½′
Value of ΔP, in meters	50, 475. 93	25, 237. 96	12, 618. 98	35, 849. 06	17, 924. 53	8, 962. 26
Value of x, in meters	50, 475. 82	25, 237. 95	12, 618. 98	35, 848. 79	17, 924. 50	8, 962. 26

CONVERSION DATA

Values in meters on the spheroid can be transformed easily into measurements in inches on any map scale by reducing meters to inches and dividing the result by the scale relation. In the following table the two operations have been combined into one factor, and the table will be found convenient for use in conversion by logarithms or for use by direct multiplication in a computing machine. The tables are based on the United States legal value of 1 meter = 39.37 inches, log = 1.5951654

Scale	Log to be added	Multiplication factor
1 : 5, 000	7. 8966954–10	0. 0078740000
1 : 10, 000	7. 5951654–10	. 0039370000
1 : 12, 000	7. 5159842–10	. 0032808333
1 : 20, 000	7. 2941354–10	. 0019685000
1 : 24, 000	7. 2149542–10	. 0016404167
1 : 31, 250	7. 1003154–10	. 0012598400
1 : 31, 680	7. 0943802–10	. 0012427399
1 : 48, 000	6. 9139242–10	. 0008202083
1 : 62, 500	6. 7992854–10	. 0006299200
1 : 63, 360	6. 7933502–10	. 0006213699
1 : 96, 000	6. 6128942–10	. 0004101042
1 : 125, 000	6. 4982554–10	. 0003149600
1 : 192, 000	6. 3118642–10	. 0002050521
1 : 250, 000	6. 1972254–10	. 0001574800
1 : 500, 000	5. 8961954–10	. 0000787400
1 : 750, 000	5. 7201041–10	. 0000524933
1 : 1, 000, 000	5. 5951654–10	. 0000393700

Other interesting data concerning scale relations will be found in Tables 40 and 44, Geological Survey Bulletin 650.

CONSTRUCTION OF PROJECTIONS

Different methods of construction.—Polyconic projections may be constructed by hand, by using the instructions and tables published in Coast and Geodetic Survey Special Publication 5, which gives the required values in meters on the surface of the spheroid, or by using the instructions and tables given in this publication with measurements in inches on the map scale desired; or they may be constructed mechanically by means of a Bumstead projection plate. The practice of the Geological Survey indicates preference in the reverse order from that given above. Directions for constructing projections by hand can be given best by means of practical examples, but in general a central meridian is assumed upon which the intersections of the parallels are plotted to scale. Each parallel is then developed separately as an arc of a circle with its center lying in the extension of the central meridian. The arcs of the developed parallels are subdivided to scale, and the meridians are drawn through the corresponding subdivisions. However, in actual practice on projections of small quadrangles the parallels are not drawn as arcs of circles, but their intersections with the meridians are plotted from the computed x and y values, and the sections of the parallels between adjacent meridians are drawn as straight lines. On polyconic projections of quadrangles of 1° or smaller all meridians may be drawn as straight lines, and in large-scale projections of small quadrangles in low latitudes both meridians and parallels may be drawn as straight lines. For example, the curvature of the parallels of a projection of a 15′ quadrangle in latitudes from 0° to 25° on a scale of 1 : 48,000 or for a 7½′ quadrangle in any latitude on a scale of 1 : 31,680 or larger is so small that it can not be plotted.

The meridional distances given in the tables apply to the central meridian of the projection, but for any standard quadrangle the difference in the curvature of the several parallels is so slight that the distances given for the central meridian can be taken for all other meridians.

Geological Survey method.—For making a polyconic projection by the Geological Survey method it is necessary to have a metal straightedge graduated in inches, with one inch at one end subdivided into hundredths of an inch, the scale being standardized and the straightedge being as long as the longest dimension of the projection; a good rigid-beam compass with micrometer movement; a hard chisel-point pencil; a plotting needle; and the tables in this publication.

To illustrate this method the construction of a polyconic projection on a scale of 1:48,000 of the 15-minute quadrangle lying between north latitudes 40° 15′ and 40° 30′ and between west longitudes 88° 00′ and 88° 15′ is described. (See fig. 5.) The projection will show each 5-minute meridian and parallel. The central meridian of the

projection will represent the meridian of longitude 88° 07½′ and will be used for construction only. Likewise the perpendicular crossing the central meridian at latitude 40° 22½′ will be used for construction only. The geometry of the construction given below is slightly different from previously established practice, owing principally to an effort to eliminate the plotting of the small ordinates of curvature, which is very difficult in a projection of a small quadrangle.

In Table 2 the group of ordinates and meridional distances computed for latitude 40° may safely be used for all latitudes between 39° 30′ and 40° 30′ without interpolation between the values given and those computed for latitudes 39° and 41°. The meridional distance

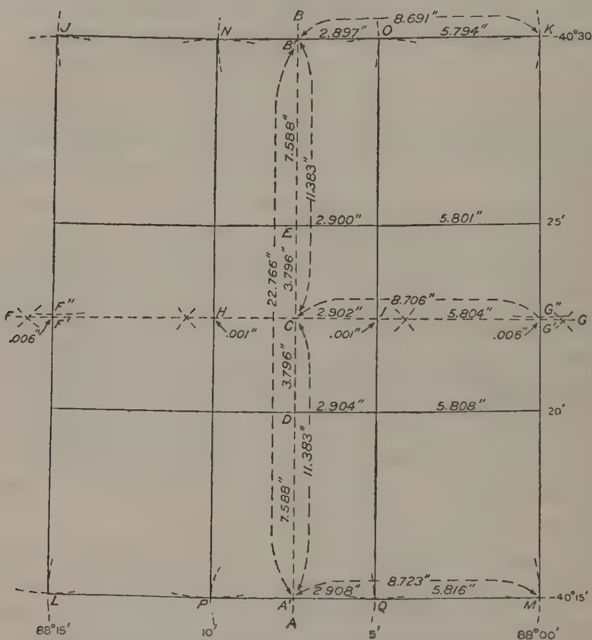

FIGURE 5.—Polyconic projection of 15-minute quadrangle

for 2½′ of latitude is found to be 3.796 inches; for 5′, 7.588 inches; for 7½′ 11.383 inches; for 10′, 15.179 inches; and for 15′, 22.766 inches. In the part of the table headed "Abscissas of developed parallel" the x values for 2½′ and 7½′ of longitude in latitude 40° 15′ are found to be 2.908 inches and 8.723 inches, respectively. The x values for latitude 40° 20′, 40° 22½′, 40° 25′, and 40° 30′ are shown in Figure 5. It should be noted that the measurements given here and on Figure 5 were taken from an old table, and some of them contain small errors in the third decimal place, which have been corrected in Table 2. In the group of ordinates of developed parallel the y value for 7½′ of longitude is found to be 0.006 inch, and for 2½′ of longitude 0.001 inch. These are all the measurements

needed to proceed with the constuction of the projection. It is impossible to plot the y value for $2\frac{1}{2}'$ of longitude and difficult to make an individual plotting of the y value for $7\frac{1}{2}'$ of longitude; but 0.006 can be added to or subtracted from any tabulated length of meridional arcs and the resultant distance measured on the metal scale, and this is done in the following description.

Draw the central construction meridian AB in vertical position near the center of the map; select the mid-point C as the center of the projection, and lay off from C the meridional distances for $2\frac{1}{2}'$ and $7\frac{1}{2}'$ of latitude—CE (3.796 inches) and CB′ (11.383 inches) above and CD (3.796 inches) and CA′(11.383 inches) below. The over-all distance A′B′ (22.766 inches) for 15′ of latitude should be used to check the plotting. At the mid-point C erect the perpendicular FG, using the points A′ and B′ as centers for long arcs and the points D and E as centers for short arcs. Lay off on the construction line FG the abscissas of the developed parallel for $2\frac{1}{2}'$ and $7\frac{1}{2}'$ of longitude for latitude 40° $22\frac{1}{2}'$—CH and CI (2.902 inches) and CF′ and CG′ (8.706 inches).

With the points F′ and G′ as centers and a radius equal to the meridional distance for $7\frac{1}{2}'$ of latitude plus the ordinate for $7\frac{1}{2}'$ of longitude ($11.383+0.006=11.389$ inches), strike arcs at J and K. Then with the same points as centers and a radius of 11.377 ($11.383-0.006$) strike arcs at L and M. In striking these arcs use the metal point of the beam compass rather than the pencil point, and either scratch the paper lightly or place under the metal point a small piece of carbon paper made by rubbing a piece of thin tracing paper with a hard pencil. This obviates the inaccuracy of using the pencil point of the beam compass to take an exact measurement from the scale.

With the points H and I as centers and a radius equal to the meridional distance for $7\frac{1}{2}'$ of latitude (11.383 inches), strike arcs at N and O above and P and Q below. The true meridional distance as here used is generally taken in constructing the inner meridional distance of $7\frac{1}{2}'$ of latitude on a scale of 1:48,000 or larger, as it is impracticable to use the small ordinate for $2\frac{1}{2}'$ of longitude. However, should the more rigid construction be required, it may be done in the following manner: With points H and I as centers and a radius equal to the meridional distance for $7\frac{1}{2}'$ of latitude plus the ordinate for $2\frac{1}{2}'$ of longitude ($11.383+0.001=11.384$ inches), strike arcs at N and O. Then with the same points as centers and a radius equal to the meridional distance minus the $2\frac{1}{2}'$ ordinate ($11.383-0.001=11.382$ inches), strike arcs at P and Q.

With the points B′ and A′ as centers and radii equal to the proper abscissas, strike arcs at J, K, L, and M, and also at N, O, P, and Q. Check the length of the diagonals JM and KL, which should be exactly the same. Draw the straight lines JL and KM through the

intersections of the arcs at J, L, K, and M, and the straight lines NP and OQ through the intersections of the arcs at N, P, O, and Q. These lines represent the four meridians on the projection, and although theoretically they are curves concave to the central meridian, yet in practice they can be drawn only as straight lines. The four intersections at the top and the four at the bottom of the projection are the exact intersections of the four meridians with the limiting parallels.

With the beam compass set at the length of the meridional distance for 5′ of latitude, plot along all four meridians down from J, N, O, and K and up from L, P, Q, and M, and check the middle 5′ sections of the meridians, thus locating the intersections of the four meridians with the parallels 40° 20′ and 40° 25′.

All the necessary intersections for the projection of this 15′ quadrangle have now been plotted without trying to make an individual plotting of 0.006 inch from the points F′ and G′, which only the most skilled draftsmen can accomplish, and the same setting of the beam compass has been used for all equal measurements, thereby strengthening the construction.

Check the construction by measuring over-all distances and by testing corresponding diagonals of all combinations of projection blocks.

Although it is customary to show only the 5′ intervals on a projection for a 15′ quadrangle, it may be desired to develop the central parallel, which, in the projection under construction, would fall on latitude 40° 22½′. If so, proceed in the following manner: With the beam compass set at the meridional distance for 7½′ and plotting along the meridians down from J and K and checking by plotting up from L and M, locate the points F″ and G″, which are the intersections of the limiting meridians with the central parallel at latitude 40° 22½′. The points H and I already determined are the intersections of this parallel with the inner meridians, as no ordinates can be plotted at these intersections. Draw the parallels by drawing straight lines between the plotted intersections, as the curvature of the parallels of any standard quadrangle within the limits of the United States is too small to be drawn as a curve. Letter the latitude and longitude as shown in Figure 5, add the scale, the name of the quadrangle, and the initials or name of the person making the construction, and the projection is completed. It should, however, be checked carefully by another person.

In any projection where the ordinate of a developed parallel at the limiting meridians is less than 0.005 inch it is impracticable to plot the curvature, and the parallels should be represented as straight lines perpendicular to the central meridian. This will be true of projections of maps of standard 15′ quadrangles between latitudes 0°

and 25° on the scale of 1:48,000 and of standard 7½′ quadrangles in any latitude on scales of 1:31,680 and larger.

Interpolation for other scales.—This bulletin gives tables for all the standard field scales employed by the Geological Survey, but use of other projections may be required, and any table may, with certain limitations, be used for scales half as large or twice as large. The abscissas of developed parallels and the meridional distances are both in direct proportion to the scales and practically in proportion to the latitude and longitude intervals, so that the abscissa for 2′ of longitude at latitude 40° on the scale of 1:24,000 is the same for 1′ of longitude at latitude 40° on the scale of 1:12,000. Likewise the meridional distance given for a latitude interval of 2′ on the scale of 1:24,000 is the same for 1′ on the scale of 1:12,000.

The ordinates of developed parallels are also directly proportional to the scales, but the ordinates are also proportional to the squares of the distances from the central meridian, which may lead to confusion in interpolation for a different scale. For example: For a longitude interval of 5′ in latitude 40° on a scale of 1:24,000 the ordinate of developed parallel is 0.0054 inch. The ordinate is not the same for a longitude interval of 2½′ on a scale of 1:12,000 but is 0.027, or one-half as much.

The following rules may develop discrepancies in the third decimal place, but these will be too small to plot: To halve the scale (for example, to make a projection on a scale of 1:48,000 from tables for the scale of 1:24,000), use correct arguments for the scale desired and divide all values given in the table by 2. To double the scale (for example, to make a projection on a scale of 1:12,000 from tables for the scale of 1:24,000), use correct arguments for the scale desired and multiply all values given in the table by 2.

Polyconic projections on scales for which no convenient tables are given with data in inches are best constructed directly from the data given in Coast and Geodetic Survey Special Publication 5, the dimensions in meters on the spheroid being reduced to meters on the map scale and plotted by means of a metric scale. Instructions for making projections by this method are given in Special Publication 5 and also in Geological Survey Bulletin 788–E.

MODIFIED POLYCONIC PROJECTION OF MAP OF THE WORLD ON THE MILLIONTH SCALE

GENERAL SPECIFICATIONS

On November 22, 1909, the International Map Committee adopted uniform specifications for the sheets of the map of the world on a scale of 1:1,000,000. Each sheet of this series of maps covers an area of 4° of latitude by 6° of longitude and is designated by a letter and a number preceded by the word "North" for the northern hemisphere

and by the word "South" for the southern hemisphere. Reckoning from the Equator to the north or to the south, each 4° belt of latitude is designated by a letter—A for the belt from 0° to 4°, B for the belt from 4° to 8°, etc. Reckoning from the international date line at 180° longitude (east or west of Greenwich) each zone of 6° of longitude is designated by a number—1 for the zone from 180° to 174° west longitude, 2 for the zone 174° to 168°, etc., up to 60 for the zone 174° to 180° east longitude. Thus the Boston sheet, covering the area between north latitudes 40° and 44° and between west longitudes 66° and 72°, is designated "North K–19."

The projection adopted for the sheets of this series of maps is a modified polyconic projection so designed as to represent all the meridians as straight lines on the map and to make the average scale error as nearly zero as possible by bringing the top and bottom parallels of the ordinary American polyconic development closer together without alteration, so that the scale will be true along these two parallels and along the meridians 2° east and west of the central meridian. The result is that the scales along the other interior meridians are reduced and the scale along the limiting meridians is enlarged. This arrangement gives four instead of three lines of strength in which the scale is true, and the maximum error in any other line is much less than in the American polyconic projection.

The top and bottom parallels of each sheet are drawn in the usual way, as circles with centers lying in the prolongation of the central meridian, but are actually plotted from the rectangular coordinates of the intersections of the two parallels with the several meridians. These two parallels are therefore subdivided true to scale. Straight lines representing the meridians are then drawn connecting corresponding intersections on the top and bottom parallels.

In the resolutions of the International Map Committee it is not stated how the 4° lengths of the meridians are to be subdivided. United States Coast and Geodetic Survey Special Publication 68 states that "no doubt, an equal division of the central meridian was intended." Arthur R. Hinks, in his admirable treatise "Map projections," states, "it may be supposed that they are divided equally." Antoni Lomnicki, in a paper entitled "Projekcja Miedzynarodowej Mapy Swiata," published at Lwow in 1927, comments as follows: "It has been ascertained that these differences are so insignificant as to be a negligible quantity on a map drawn to a scale of 1/M, a fact which nevertheless should not be omitted in the instructions."

It has been the practice of the United States Geological Survey to compile the sheets in four quarters on the scale of 1:500,000 and to subdivide each meridian in proportion to the correct length of each 1° interval of latitude. Therefore, these new tables have been constructed on that basis.

JOINING OF SHEETS

Any 4° by 6° sheet will join exactly with the four sheets on its margins, but the corner sheets to complete a block of nine will not fit along their two adjacent edges simultaneously; they will fit on one edge, but there will be in theory on the other a small wedge-shaped gap, as is shown in Figure 6. In practice these gaps will be found to be very small, usually less than the average expansion or shrinkage of map paper. The map user will seldom desire to join together exactly more than nine sheets at once. Many objections have been made to the use of this projection because of this difficulty in joining corner sheets and because of distortions in scale, azimuth, and shapes near the east and west limits of the sheets, but there does not seem to be any other projection of sufficiently greater merit to offset the principal advantages of the modified polyconic projection, which are its ease of construction from simple tables and its adaptability to

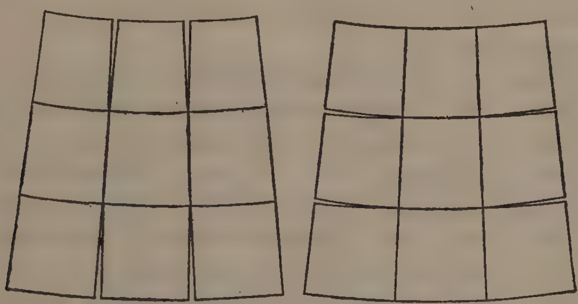

FIGURE 6.—Junction of sheets of map of the world

small groups of sheets representing areas in any part of the world. Any errors in a single sheet are negligible in view of the limitations of drafting, engraving, and quality of map paper. For example, the maximum error in scale occurs along the east and west meridians of a sheet representing an area between latitudes 0° and 4° and is about 1/1300, or +0.076 per cent; on the scale of 1 : 1,000,000 this amounts to about one-third of a millimeter in the total height of the sheet. The substitution of the Lambert conformal projection or the Albers conical equal-area projection has been suggested. The writer has investigated the effect of the use of the Lambert conformal projection for the millionth-scale sheets of the area of the United States and finds that, in the area between latitudes 24° and 52°, the Lambert conformal projection would probably be based on two standard parallels at latitudes 29° and 47°. Such a projection would introduce scale errors averaging about +1 per cent in sheets representing areas adjacent to the limiting parallels (24° and 52°) and averaging

−1 per cent in sheets representing areas between latitudes 36° and 40°, although the scale would be correct in sheets for areas along the two standard parallels. Sheets on the modified polyconic projection representing areas between latitudes 24° and 28° introduce maximum scale errors of only 0.06 per cent, and between latitudes 48° and 52° of only 0.03 per cent, which are less than the usual distortion of map paper. Therefore for all practical purposes maps on the modified polyconic projection covering any area in the United States are as true to scale as maps on the Lambert conformal projection for areas along the standard parallels. Surely the necessity of correcting all distance measurements on a sheet by an amount as large as 1 per cent would be a distinct disadvantage. Of course it would be possible to select zones of lesser extent in latitude, even to the extreme case of considering each row of 4° by 6° areas a separate zone, with two standard parallels for each zone, but any of these selections would involve difficulty in joining sheets in adjacent zones, and much confusion would be caused if each country used one or more different pairs of standard parallels.

The resolutions of the International Map Committee state that "north of latitude 60° N. and south of latitude 60° S. it shall be permissible to join two or more adjoining sheets of the same zone, so that the combined sheet covers 12°, 18°, etc., of longitude." United States Coast and Geodetic Survey Special Publication 68 comments on this statement as follows: "The provisions also fail to state whether, in the sheets covering 12° of longitude instead of 6°, the meridians of true length shall be 4° instead of 2° on each side of the central meridian; but such was no doubt the intention." A. R. Hinks makes a similar statement in his book on map projections. The writer doubts the correctness of this interpretation but thinks that the committee had in mind simply the assemblage of two or more independently constructed sheets in a single map so as to avoid a series of maps of very small width. In other words, he thinks that the committee had in mind a printing and distribution problem rather than a cartographic problem. A row of 4° by 12° sheets would fail to join a row of 4° by 6° sheets immediately to the south by wedges similar to those illustrated in Figure 6, whether the sheets were constructed with 4° or 8° between the standard meridians, but if the interval were 8° the maximum scale error in the northern row would be increased four times. The Geological Survey has not yet compiled any sheets of the millionth-scale series for areas north of latitude 60°, and it hopes that before it is required to do so the International Map Committee will decide the matter definitely.

DRAWING OF PARALLELS

There has been considerable discussion of the difficulty of drawing the arcs of circles representing the limiting parallels and the curves representing the three interior parallels, which Lomnicki calls shortened epicycloids. The maximum deviation of the curve representing a 1° arc of a parallel from the chord joining the ends of such a curve is in latitude approximately 45°, and on a scale of 1:1,000,000 the maximum ordinate from the mid-point of such a chord to the curve is 0.1 millimeter. It is practically impossible for a draftsman to draw such a curve, as the deviation from a straight line is only about the width of a finely inked line. It is equally impracticable to construct and use a compass bar long enough to draw the arcs of the parallels, requiring for the scale of 1:1,000,000 a radius of about 4 meters for the circle representing the parallel of 60°, one of about 8 meters for the parallel of 40°, and one of over 90 meters for the parallel of 4°. Therefore the United States Geological Survey constructs these parallels by drawing straight lines joining adjacent intersections of the parallels with meridians 1° apart. For arcs of parallels below 50° the deviation from true circles can not be detected even on an engraved copper plate, although theoretically such methods of construction introduce angles at the crossings of the meridians. Such errors on a printed map are less than the usual distortion of map paper. For short arcs of the parallels above 60° it may be practicable to use mechanically constructed curves. As a matter of fact, the Geological Survey compiles the millionth-scale sheets on a scale of 1:500,000 by plotting the intersection of each half degree meridian and parallel, but in publication the engraver constructs a new projection on the copper plate instead of copying photographically the results of the cartographer's compilation.

DESCRIPTION OF TABLES

Table 5 gives the length of each developed meridian and the x and y coordinates of the intersection of each meridian with each of the developed parallels, in meters on the natural scale. To convert these data into map distances on the scale of 1:1,000,000, move the decimal point three places to the left and plot in millimeters. For the scale of 1:500,000 follow the same rule and then double all the measurements. Table 6 gives the data in inches on the scale of 1:1,000,000. Each 1° length of the standard meridians (2° from the central meridian) and the x and y coordinates of the intersections of all three meridians east and west of the center meridian with the upper and lower developed parallels of each sheet (0°, 4°, 8°, 12°, etc.) were computed by the rigid formulas given hereafter in this paper. In making these computations the dimensions of the spheroid

given in the proceedings of the International Map Committee at the meeting in London in November, 1909, were used, as follows:

Semimajor axis $a = 6,378,240$ meters
Semiminor axis $b = 6,356,560$ meters

These dimensions differ slightly from those developed by Col. A. R. Clarke in 1880, which were—

$a = 6,378,249$ meters
$b = 6,356,515$ meters

After the x and y coordinates of the intersections of each of the meridians with the upper and lower parallels were computed, each 4° length of the central meridian and of the meridians 1° and 3° from the central meridian were computed by simple formulas, as described hereafter in this paper. The length of the shortened central meridian could have been computed directly by the formulas given by M. Ch. Lallemand[1] and the lengths of the other developed meridians could then be computed by applying the simple formulas for the magnification of meridians of the polyconic projection. Each 4° length of these three meridians was then divided into 1° lengths in direct proportion to the true 1° lengths of the meridian as represented by the 1° lengths of the standard meridians 2° from the center. These 4° meridional lengths could be divided into four equal parts, and the errors introduced would be small—for example, in the 1° meridional length between latitudes 43° and 44° the maximum error would be about 30 meters, or 0.03 millimeter on a scale of 1:1,000,000. This difference can not be plotted, but for the purpose of analysis and for large-scale compilations it seemed desirable to calculate the meridional lengths in their true relation. The x and y coordinates for the intersections of the meridians with the three inner parallels were then calculated by subdividing the 4° differences in the values of x and y into 1° units in the same proportion as the 4° lengths of the meridians were subdivided. It would have been sufficient for all practical purposes to divide by 4 the 4° differences in the values of x and y and then add one-fourth, one-half, and three-fourths of these quantities to the x and y values for the proper limiting parallel. Moreover, the simple approximate formulas for x and y (with slight modifications) given by Lallemand could have been used without seriously affecting the accuracy of the results.

Lomnicki has suggested that tables for the modified polyconic projection should be computed on the basis of the Hayford spheroid, which probably represents the actual shape of the earth better than

[1] Paris Acad. Sci. Compt. Rend., vol. 153, p. 561, 1911.

any other spheroid yet developed. The dimensions of this spheroid were published by Hayford as follows:

$$a = 6{,}378{,}388 \text{ meters}$$
$$b = 6{,}356{,}909 \text{ meters}$$

The writer has computed the lengths of each 1° meridional arc for the standard meridian 2° from the central meridian between latitudes 40° and 44°, based on the Hayford spheroid, and the table given below permits a comparison of these values with those based on the Clarke spheroid.

Lengths of meridian 2° from central meridian, in meters, natural scale

Latitude	Clarke spheroid, 1880	Hayford spheroid
40°–41°	111, 042. 2	111, 047. 4
41°–42°	111, 061. 8	111, 066. 8
42°–43°	111, 081. 5	111, 086. 3
43°–44°	111, 101. 3	111, 105. 9
40°–44°	444, 286. 8	444, 306. 4

The difference in the 4° length of the meridian is less than 20 meters on the spheroid, or 0.02 millimeter on a scale of 1 : 1,000,000. It is apparent that these small differences can not be plotted, but if for any reason the commission should desire to have these tables computed on the basis of the Hayford spheroid, the Geological Survey will be glad to do the work. However, before taking any such action it seems desirable to have comments and criticism on the tables presented herewith, particularly as to their general form. Moreover, it seems desirable to have the commission settle definitely the size of sheets and the arrangement of standard meridians to be used in latitudes above 60°.

METHOD OF CONSTRUCTION OF PROJECTION

If a map of a millionth-scale unit area is to be compiled in a single sheet on a scale of 1 : 1,000,000, it will not be necessary to plot the x and y coordinates of the interior intersections but only to plot the intersections of each meridian with the upper and lower parallels and then draw the meridians as straight lines and subdivide each one of them either into four equal parts or in proportion to their actual 1° lengths. If the map is to be compiled on a scale much larger than that of publication, it is advisable to plot the x and y coordinates of the intersection of each 1° meridian and parallel, and it may be desirable for the cartographer to construct the intersection of each half degree meridian and parallel.

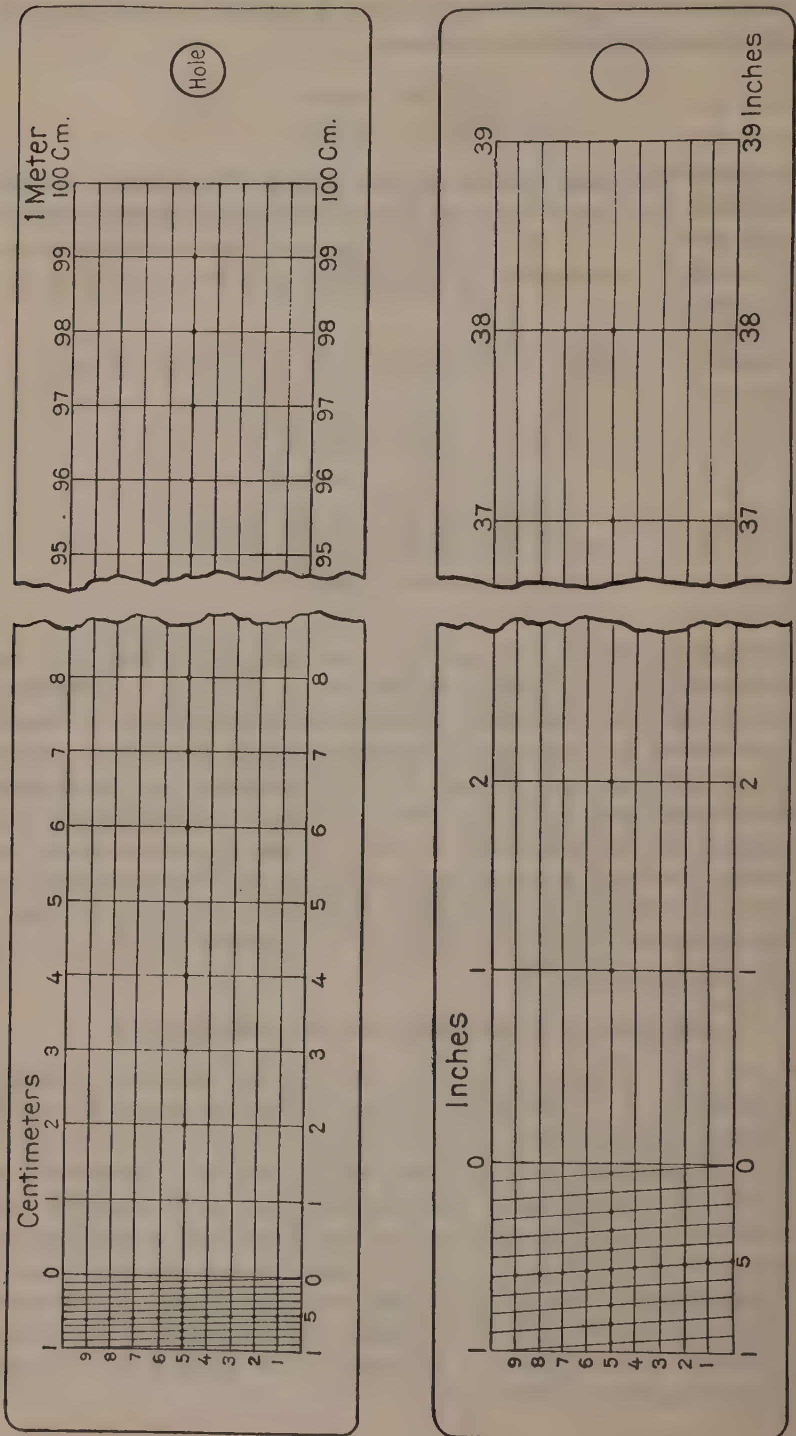

FIGURE 7.—Special scale used by the United States Geological Survey

It is often difficult to plot the small ordinates of the intersections, but it is practicable to add these values to or subtract them from the lengths of the meridional arcs and to construct the projection without making a single individual plotting of a small ordinate. This method involves the initial construction of the abscissa of the central parallel and permits the construction of each intersection, by coordinates, or only the intersections of the meridians with the limiting parallels, as may be desired. The difficulty of constructing abscissas at right angles to the central meridian near the upper and lower edges of the compilation sheet, together with the difficulty of making individual plottings of the small ordinates, seems to warrant the presentation of this method in this paper. In so doing the writer has taken the example of the construction of sheet K–18, embracing the area between latitudes 40° and 44° north and longitudes 72° and 78° west.

The following materials are required: A standard metal scale 1 meter long subdivided throughout in centimeters and with 1 centimeter length at one end subdivided into tenths of millimeters (scales used by the United States Geological Survey accomplish the graduation of millimeters into tenths by means of diagonal scales; see fig. 7); a good rigid-beam compass with micrometer movement; a hard chisel-point pencil; a plotting needle; and a copy of United States Geological Survey Modified Polyconic Projection Tables.

Make a working diagram of the projection and enter on it from the tables all the dimensions that are needed. (See fig. 8.)

Draw the central meridian AB, representing the meridian of 75° west, near the center of the map sheet; select the middle point C as the center of the projection, and lay off from C the meridional distances for 2° of latitude on the central meridian above and below the central parallel of 42° north; CB′ = 222.11 millimeters and CA′ = 222.03 millimeters. Subdivide these into 1° lengths, as B′E = 111.07 millimeters, CE = 111.04 millimeters; check the over-all distance A′B′ = 444.14 millimeters. If there is any material difference between the computed lengths of CA′ and CB′ (more than 0.1 millimeter) lay off for purposes of construction the points A and B about 1 centimeter below and above A′ and B′, respectively, and exactly equidistant from C. At the point C erect the perpendicular FG, using the points A′ and B′ (or A and B) as centers of long arcs and the points D and E as centers of short arcs. This line FG is the X axis of the parallel representing latitude 42°. Lay off on the line FG the abscissas (x values) of the developed parallel for 1°, 2°, and 3° of longitude from the central meridian; CJ = CK = 82.80 millimeters, CH = CI = 165.59 millimeters, and CF′ = CG′ = 248.36 millimeters.

With the points F′ and G′ as centers and a radius equal to the meridional distance between latitudes 42° and 44° along the meridian

3° from the central meridian plus the ordinate (y value) of the developed parallel for latitude 44° at the meridian 3° from the central meridian (222.28 + 4.36 = 226.64 millimeters), strike arcs at L and M. Then with the same points as centers and a radius equal to the meridional distance between latitudes 40° and 42° minus the ordinate for 40° (222.20 − 4.31 = 217.89 millimeters), strike arcs at N and O. In drawing these arcs use the metal point of the beam compass rather than the pencil point, and either scratch the paper lightly or place under the metal point a small piece of carbon paper made by rubbing a piece of thin tracing paper with a hard pencil. This eliminates the

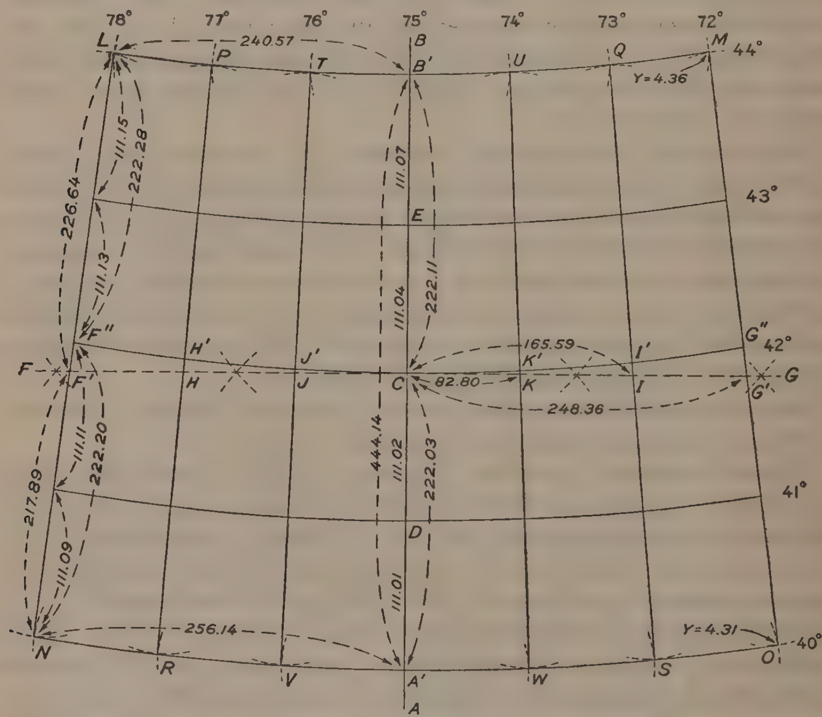

FIGURE 8.—Construction of modified polyconic projection

inaccuracy of using the pencil point of the beam compass to take an exact measurement from the scale.

Then in a similar manner and with the points H and I and the points J and K as centers and with radii equal to the proper meridional distances plus or minus the corresponding ordinates, as the case may be, strike arcs at P, Q, R, and S and at T, U, V, and W. With the points B′ and A′ as centers and with radii equal to the proper abscissas strike arcs at L, M, N, and O, at P, Q, R, and S, and at T, U, V, and W. (Note that theoretically these radii should be the chords joining the ends of the developed parallel, but in the maximum curvature of the developed 3° parallel of 60° latitude the difference between the chord

and the abscissa on the scale of 1 : 1,000,000 is only +0.04 millimeter, which can not be plotted.)

Before proceeding further check the over-all diagonals of the projection LO = MN and if not exactly the same try the diagonals CL = CM and CN = CO so as to locate and correct any inaccuracy of the construction thus far. Draw the developed meridians as straight lines joining L and N, P and R, etc., and draw the developed limiting parallels as straight lines (or smooth curves) joining B′ and T, A′ and V, etc. This gives all of the projection except the three interior parallels.

With the beam compass set at the length of the developed meridional arc between 42° and 44° for each meridian, plot downward along the meridians from L and M, from P and Q, etc., locating the intersections F″, G″, H′, I′, etc. Then with the beam compass set at the length of the developed meridional arc between 40° and 42° for each pair of meridians plot upward along the meridians from N and O, from R and S, etc., thus checking the locations of the intersections along the central parallel. In a similar manner locate the intersections of the meridians with the parallels of 41° and 43° by plotting 1° lengths of developed meridian from the extreme parallels and checking from the central parallel. Construct the three central parallels by drawing straight lines between adjacent points of intersection with meridians or by drawing smooth curves through these points.

Add the latitude and longitude designations of each degree intersection along the limiting meridians and parallels. Add the name and number of the sheet, the scale, the type of projection, and the name of the man making the projection and the date on which it was made. These may seem to be matters of minor detail, but the writer has noticed failure to include these data so many times that he ventures to call attention to their importance.

The projection is now completed and has been constructed in an orderly manner, with a minimum number of settings of the beam compass and without making a single individual plotting of any of the small ordinates. The projection should be checked carefully by another cartographer.

THEORY OF THE MODIFIED POLYCONIC PROJECTION

Nomenclature.—The practical cartographer is often confused by the nomenclature relating to map projections, largely because cartographers and mathematicians of different countries use different symbols for the same thing. Except for one or two terms, the writer has used the nomenclature employed by the United States Coast and Geodetic Survey in its recent publications. The symbols used in

developing the theory of the polyconic projection, with their corresponding definitions, are as follows:

a = semimajor axis of the earth or spheroid.

b = semiminor axis of the earth or spheroid.

e = eccentricity of generating ellipse $= \sqrt{\dfrac{a^2-b^2}{a^2}}$

f = flattening of generating ellipse $= \dfrac{a-b}{a}$

n = constant $= \dfrac{a-b}{a+b}$

ρ_m = radius of curvature of a meridional section.

ρ_n = radius of curvature of a section normal to the meridian.

ϕ = astronomic or geographic latitude of a point on the earth.

Ψ = geocentric latitude of a point on the earth.

$\Delta\phi$ = difference of latitude between two points on the same meridian.

λ = longitude of a point on the earth with reference to Greenwich.

$\Delta\lambda$ = difference of longitude between two points on the same parallel or the angle at the pole between the meridians passing through these points.

M = length of arc of a meridian from the Equator to latitude ϕ.

ΔM = length of arc of a meridian between two parallels.

L = length of an arc of a parallel from the meridian of Greenwich to longitude λ.

ΔL = length of an arc of a parallel between two meridians.

θ = angle at the apex of the developed tangent cone between the central meridian and another meridian.

l = slant height of the tangent cone or the radius of the developed parallel.

x = abscissa of any point on a developed parallel with reference to the central meridian.

y = ordinate of any point on a developed parallel with reference to the tangent to that parallel at the central meridian.

Dimensions of the spheroid.—In the modified polyconic projection dimensions of the spheroid differing only slightly from those developed by Clarke in 1880 have been used, as follows:

$a = 6{,}378{,}240$ meters	$\log a = 6.8047008568$
$b = 6{,}356{,}560$ meters	$\log b = 6.8032221507$
$\dfrac{b}{a} = 0.9966009432$	$\log \dfrac{b}{a} = 9.9985212938-10$
$\dfrac{b^2}{a^2} = 0.9932134400$	$\log \dfrac{b^2}{a^2} = 9.9970425877-10$
$e^2 = 0.0067865600$	$\log e^2 = 7.8316496930-10$
$f = \dfrac{1}{294.199}$	$\log f = 7.5313588078-10$
$n = 0.0017024217$	$\log n = 7.2310671463-10$

Radii of curvature.—It is not necessary to compute the radius of curvature of a meridional section, as the meridional arcs are too long to permit the computation of their length by the approximate formula $\Delta M = \rho_m \Delta\phi$. However, in case it is desired to find the values of ρ_m the following formula may be used:

$$\rho_m = \frac{a(1-e^2)}{(1-e^2\sin^2\phi)^{\frac{3}{2}}}$$

Values of the radius of curvature of a section normal to the meridian (ρ_n) are needed in the computation of x and y and must be computed for each fourth degree of latitude, 0°, 4°, 8°, etc. Values of ρ_n are used in computing the lengths of the arcs of the parallel, but as the lengths of these arcs are not needed in constructing or checking the projection, it is not necessary to compute the values of ΔL. The following formula is used for values of ρ_n:

$$\rho_n = \frac{a}{(1-e^2\sin^2\phi)^{\frac{1}{2}}}$$

Values of ρ_n and their logarithms for each fourth degree of latitude from 0° to 60° are given in the following table:

Radii and logarithms of radii of curvature of section normal to meridian for each fourth degree of latitude from 0° to 60°

[Values of ρ_n in meters, based on Clarke spheroid of 1880]

Latitude	ρ_n	Log ρ_n
°		
0	6, 378, 240. 000	6. 8047008568
4	6, 378, 345. 318	6. 8047080207
8	6, 378, 659. 251	6. 8047294026
12	6, 379, 175. 780	6. 8047645694
16	6, 379, 884. 995	6. 8048128504
20	6, 380, 773. 276	6. 8048733134
24	6, 381, 823. 547	6. 8049447921
28	6, 383, 015. 586	6. 8050259049
32	6, 384, 326. 402	6. 8051150824
36	6, 385, 730. 701	6. 8052105995
40	6, 387, 201. 280	6. 8053106023
44	6, 388, 709. 631	6. 8054131497
48	6, 390, 226. 444	6. 8055162481
52	6, 391, 722. 180	6. 8056178898
56	6, 393, 167. 653	6. 8057160934
60	6, 394, 534. 596	6. 8058089413

Order of computations.—The procedure followed in computing the lengths of the meridional arcs and the values of the x and y coordinates is not as simple as for the American polyconic projection, because only the length of the standard meridians and the x and y values of intersections of the meridians with the upper and lower parallels can be computed by the formulas used for the American polyconic projection. Lomnicki, in the publication cited above, gives rigid formulas for computing the x and y coordinates of any point on the map, but these formulas are very intricate, and their

use is not advised. Lallemand, in the paper cited above, gives approximate formulas for the length of the central meridian and for the x and y coordinates of intersections of the meridians with the central parallel. These formulas in their general terms are intricate, and in simplifying them for application to the scale of 1:1,000,000 Lallemand has apparently used the Hayford spheroid rather than the Clarke spheroid of 1880. The writer has attempted to modify these simplified approximate formulas to apply to the Clarke spheroid of 1880 and has given them below, following the formulas used in computing these tables. Lallemand's formula for length of the central meridian (as modified) can be used without introducing serious errors, and the length of the other meridians can be computed with reasonable accuracy by applying simple factors of magnification. The writer has, however, further modified this approximate formula by giving a separate one for each meridian. Lallemand's formulas for x and y (as modified) can be used for the coordinates of the intersections of the meridians with any of the parallels without introducing serious errors on the scale of 1:1,000,000. Besides modifying these to conform to the Clarke spheroid of 1880, the writer has given a separate formula for x for each of the five parallels.

However, it seemed desirable to compute the tables presented herewith as follows: Compute the 1° lengths of the standard meridians 2° from the central meridian on the assumption that these lengths are exactly true to scale; compute the x and y coordinates of each meridian with the two standard (upper and lower) parallels; calculate the 4° meridional lengths for the central meridian and for the meridians 1° and 3° from the central meridian; subdivide these 4° meridional lengths into 1° lengths in the same proportion as the computed 1° lengths of the standard meridian bear to the 4° length of that meridian; and finally calculate the x and y coordinates of the points of intersections of the meridians with the three inner parallels. By orderly tabulation and use of computing machines the task was not difficult. The values were computed to tenths of a meter on the natural scale, which, while far beyond the needs of map projection on a scale of 1:1,000,000, may be useful in making computations on a larger scale.

Lengths of the meridians.—The length of the standard meridians 2° from the central meridian is true to scale, and each 1° length may be computed by the following formula for the American polyconic projection (see VII, p. 13), it being sufficient for all practical purposes to use the first three terms only:

$$\Delta M_2 = A_0 \Delta\phi - A_2 \cos 2\phi \sin \Delta\phi + A_4 \cos 4\phi \sin 2\Delta\phi - A_6 \cos 6\phi \sin 3\Delta\phi + \dots \quad \text{[XVII]}$$

in which

$\Delta M_2 =$ length of arc of the standard meridian, expressed in meters.
$\phi = \frac{1}{2}(\phi_2 + \phi_1) =$ mean latitude of meridional arc.
$\Delta\phi = (\phi_2 - \phi_1) =$ arc of standard meridian, expressed in degrees.

$A_0 = 111{,}132.1753$ meters	$\log = 5.0458398153$
$A_2 = 32{,}519.9882$ meters	$\log = 4.5121503781$
$A_4 = 34.6017$ meters	$\log = 1.5390974$
$A_6 = 0.0458$ meters	$\log = 8.66108 - 10$

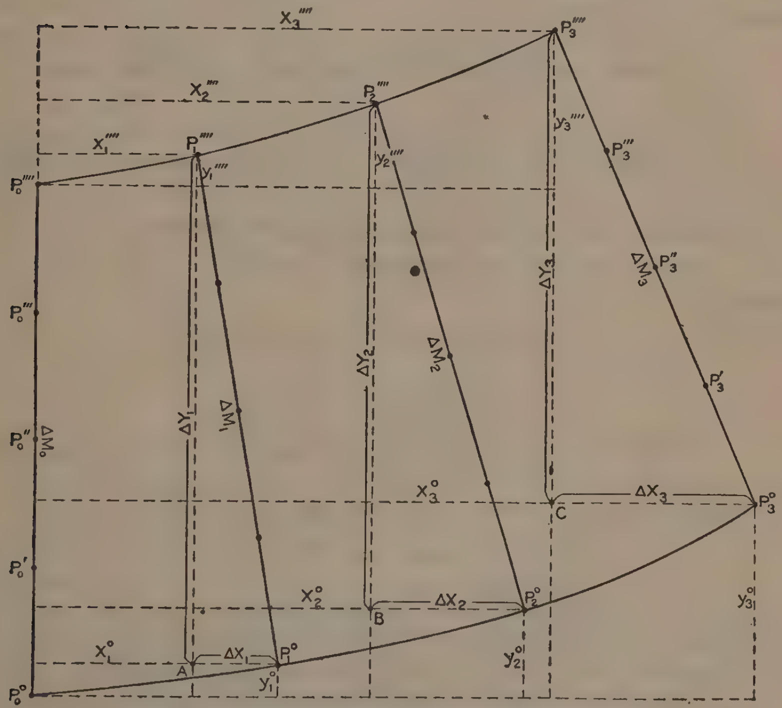

FIGURE 9.—Computation of modified polyconic projection tables

The formula given above may of course be used to compute either the 1° or the 4° length of the standard meridian, by using $\Delta\phi = 1°$ or 4°, respectively.

After the x and y coordinates of the intersections of all the meridians with the upper and lower parallels are computed, the length of the central meridian and of the meridians 1° and 3° from the central meridian may be computed by formulas developed as follows (see fig. 9):

In the right triangle B $P_2°$ P_2''''

$$\Delta Y_2 = \sqrt{(\Delta M_2)^2 - (\Delta X_2)^2} = \Delta M_2 \sqrt{1 - \left(\frac{\Delta X_2}{\Delta M_2}\right)^2}$$

Expanding the radical as a binomial series into terms which can be handled conveniently, we have

$$\Delta Y_2 = \Delta M_2 \left[1 - \frac{1}{2}\left(\frac{\Delta X_2}{\Delta M_2}\right)^2 - \frac{1}{8}\left(\frac{\Delta X_2}{\Delta M_2}\right)^4 - \cdots \right]$$

but

$$\Delta M_0 = \Delta Y_2 - (y_2'''' - y_2^\circ);$$

therefore

$$\Delta M_0 = \Delta M_2 \left[1 - \frac{1}{2}\left(\frac{\Delta X_2}{\Delta M_2}\right)^2 - \frac{1}{8}\left(\frac{\Delta X_2}{\Delta M_2}\right)^4 \right] - [y_2'''' - y_2^\circ] \text{ -- [XVIII]}$$

Similarly,

$$\Delta M_1 = \sqrt{(\Delta Y_1)^2 + (\Delta X_1)^2} = \Delta Y_1 \sqrt{1 + \left(\frac{\Delta X_1}{\Delta Y_1}\right)^2}$$

or

$$\Delta M_1 = \Delta Y_1 \left[1 + \frac{1}{2}\left(\frac{\Delta X_1}{\Delta Y_1}\right)^2 - \frac{1}{8}\left(\frac{\Delta X_1}{\Delta Y_1}\right)^4 + \cdots \right] \text{ ----- [XIX]}$$

This equation can be solved easily by using the relation

$$\Delta Y_1 = \Delta M_0 + (y_1'''' - y_1^\circ)$$

Similarly,

$$\Delta M_3 = \sqrt{(\Delta Y_3)^2 + (\Delta X_3)^2} = \Delta Y_3 \sqrt{1 + \left(\frac{\Delta X_3}{\Delta Y_3}\right)^2}$$

or

$$\Delta M_3 = \Delta Y_3 \left[1 + \frac{1}{2}\left(\frac{\Delta X_3}{\Delta Y_3}\right)^2 - \frac{1}{8}\left(\frac{\Delta X_3}{\Delta Y_3}\right)^4 + \cdots \right] \text{ ------ [XX]}$$

This equation can be solved easily by using the relation

$$\Delta Y_3 = \Delta M_0 + (y_3'''' - y_3^\circ)$$

After the 4° lengths of each meridian are found they may be subdivided into 1° lengths as follows: Take the difference between the 4° length of the standard meridian and the 4° length of each of the other meridians, divide these differences by 4, and subtract the results from or add them to each 1° length of the standard meridian. If the 4° lengths of a meridian are divided into four equal parts, as is the practice of most cartographers, the errors introduced are small; for example, in the belt between latitudes 40° and 41° the maximum error is 30 meters on the spheroid, or 0.03 millimeter on the scale of 1:1,000,000. This difference can not be plotted, but if the sheets are compiled on a larger scale it may be advisable to subdivide the 4° lengths in true proportion.

The 4° lengths of these meridians can be computed in terms of millimeters on the scale of 1:1,000,000 without introducing serious errors by the use of Lallemand's approximate formulas, modified slightly to conform to the Clarke spheroid of 1880 and to the nomenclature used in this paper, as follows:

Length of central meridian,

$\Delta M_0 = 444.40$ mm. -2.35 mm. cos 2 ϕ .... [XXI]

Length of meridian 1° from center,

$\Delta M_1 = 444.45$ mm. -2.30 mm. cos 2 ϕ .... [XXII]

Length of meridian 2° from center,

$\Delta M_2 = 444.50$ mm. -2.25 mm. cos 2 ϕ .... [XXIII]

Length of meridian 3° from center,

$\Delta M_3 = 444.70$ mm. -2.10 mm. cos 2 ϕ .... [XXIV]

Rectangular coordinates.—In the modified polyconic projection each of the parallels marking the boundaries of zones of 4° of latitude is represented as the base of a right cone tangent to the spheroid along that parallel. Each 4° developed parallel is a circle with center on the prolongation of the central meridian and with radius $l = \rho_n \cot\phi$, and the origin of the rectangular coordinates of each parallel is the point at which the developed parallel intersects the central meridian.

The rectangular coordinates of the intersections of the meridians with the upper and lower parallels are computed in the same way as for the American polyconic projection. The tables presented with this paper were computed by means of the following rigid formulas (see X and XI, p. 17):

$$x = \rho_n \cot\phi \sin(\Delta\lambda \sin\phi) \qquad \text{[XXV]}$$

$$y = 2\rho_n \cot\phi \sin^2 \tfrac{1}{2}(\Delta\lambda \sin\phi) \qquad \text{[XXVI]}$$

As each meridian on the modified polyconic projection is drawn as a straight line, whereas a true polyconic representation of each meridian except the central one would be a curve, owing to the constantly changing values of convergence, the usual formulas for the x and y coordinates can not be used for the intersections with the interior parallels. For all practical purposes it is sufficient to calculate the values of x and y for the intermediate intersections by dividing by 4 the differences of the x and y values of the intersections of each meridian with the upper and lower parallels, adding one-fourth, one-half, and three-fourths of the x difference to the x value for the upper parallel (or subtracting them from the x value for the lower parallel), and adding one-fourth, one-half, and three-fourths of the y difference to the y value for the lower parallel (or subtracting them from the y value for the upper parallel.) If more accuracy is desired the values of the 4° differences in x and y can be subdivided into 1° units in the same proportion as the 4° lengths of the meridians are subdivided. In this event it is sufficient to use the proportional parts of the standard meridian in subdividing the coordinates of all the meridians, and the following procedure may be used:

Divide each 1° length of the standard meridian by the 4° length of that meridian and multiply the differences of the x and y values of the

ends of each of the other 4° meridians by the corresponding decimal fractions thus obtained. Subtract the resulting x increments for the lower 1° interval from the corresponding x values for the lower parallel; then subtract the x increments for the second 1° interval from the x values just obtained for the parallel 1° above the lower parallel, etc. Follow the same procedure with the y values, except that the increments should be added to the y values of the lower parallel. As the decimal fractions vary but slightly from 0.25, the calculations can be simplified by applying one-fourth of the 4° difference ∓ the residual of the decimal fraction, as follows:

$$\frac{\Delta M_2(40°\text{–}41°)}{\Delta M_2(40°\text{–}44°)}=\frac{111042.242}{444286.870}=0.24993365=\tfrac{1}{4}-0.00006635$$

$$\frac{\Delta M_2(43°\text{–}44°)}{\Delta M_2(40°\text{–}44°)}=\frac{111101.271}{444286.870}=0.25006652=\tfrac{1}{4}+0.00006652$$

In a map unit lying between latitudes 40° and 44° the maximum difference between subdivision of a 4° meridian into four equal parts and subdivision in true proportion is 1.38 meters in the x value and 0.01 meter in the y value of points along the meridian 3° from the central meridian. These differences can not be plotted on a scale of 1:1,000,000 or even on a scale of 1:500,000. However, in the tables presented with this paper the x values have been computed in direct proportion to the correct subdivision of the standard meridian.

Lallemand's approximate formulas for the rectangular coordinates were developed by him for the x and y coordinates of the central parallel of the projection. The writer has modified these formulas somewhat, and as given below they may be used for the x and y coordinates of any of the parallels on a scale of 1:1,000,000 without introducing serious errors. In these modified formulas for x the five coefficients of cos ϕ apply to the five parallels of the projection, the upper coefficient applying to the upper parallel, etc. $\Delta\lambda$ is taken in degrees from the central meridian. Coordinates for ½° intersections may be computed by taking values of $\Delta\lambda=$ ½°, 1°, 1½°, etc. All values of x and y will be in millimeters on a scale of 1:1,000,000.

$$x(\text{in millimeters})=\Delta\lambda\left[\left\{\begin{matrix}111.40\\111.37\\111.33\\111.37\\111.40\end{matrix}\right\}\cos\phi-0.08\cos 3\phi\right]\text{--[XXVII]}$$

$$y(\text{in millimeters})=\Delta\lambda^2[0.49\sin 2\phi]\text{----------[XXVIII]}$$

TABLE 1.—*Coordinates for the projection of maps, scale $\frac{1}{96000}$*

Latitude of parallel	Abscissas of developed parallel — Longitude interval 5′	10′	15′	20′	30′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
0 00	3.804	7.609	11.413	15.218	22.827
10	.804	.609	.413	.218	.826
15	.804	.609	.413	.218	.826
20	.804	.609	.413	.217	.826
30	3.804	7.609	11.413	15.217	22.826
40	.804	.608	.413	.217	.825
45	.804	.608	.412	.216	.825
50	.804	.608	.412	.216	.824
1 00	3.804	7.608	11.412	15.215	22.823
10	.804	.607	.411	.215	.822
15	.804	.607	.411	.214	.821
20	.803	.607	.410	.214	.820
30	3.803	7.606	11.409	15.213	22.819
40	.803	.606	.408	.211	.817
45	.803	.605	.408	.211	.816
50	.802	.605	.407	.210	.815
2 00	3.802	7.604	11.407	15.208	22.813
10	.802	.603	.405	.207	.810
15	.802	.603	.405	.206	.809
20	.801	.603	.404	.205	.808
30	3.801	7.602	11.403	15.203	22.805
40	.800	.601	.401	.201	.802
45	.800	.600	.400	.200	.800
50	.800	.600	.399	.199	.799
3 00	3.799	7.598	11.398	15.197	22.795
10	.799	.597	.396	.195	.792
15	.798	.597	.395	.193	.790
20	.798	.596	.394	.192	.788
30	3.797	7.595	11.392	15.190	22.784
40	.797	.593	.390	.187	.780
45	.796	.593	.389	.185	.778
50	.796	.592	.388	.184	.776
4 00	3.795	7.590	11.386	15.181	22.771
10	.794	.589	.383	.178	.767
15	.794	.588	.382	.176	.764
20	.794	.587	.382	.174	.762
30	3.793	7.586	11.378	15.171	22.757
40	.792	.584	.376	.168	.751
45	.791	.583	.374	.166	.749
50	.791	.582	.373	.164	.746
5 00	3.790	7.580	11.370	15.160	22.740
10	.789	.578	.367	.156	.734
15	.789	.577	.366	.154	.731
20	.788	.576	.364	.152	.728
30	3.787	7.574	11.361	15.148	22.722
40	.786	.572	.358	.144	.716
45	.785	.571	.356	.142	.712
50	.785	.570	.355	.139	.709
6 00	3.784	7.567	11.351	15.135	22.702
10	.783	.565	.348	.130	.695
15	.782	.564	.346	.128	.692
20	.781	.563	.344	.125	.688
30	3.780	7.560	11.340	15.121	22.681
40	.779	.558	.337	.115	.673
45	.778	.556	.335	.113	.669
50	.778	.555	.333	.110	.665
7 00	3.776	7.552	11.329	15.105	22.658

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 0°	5	3.779	0.000
	10	7.557	.000
	15	11.336	.000
	20	15.115	.000
	25	18.893	.000
	30	22.672	.000
For latitude 1°	5	3.779	0.000
	10	7.557	.000
	15	11.336	.000
	20	15.115	.001
	25	18.893	.001
	30	22.672	.002
For latitude 2°	5	3.779	0.000
	10	7.557	.000
	15	11.336	.001
	20	15.115	.002
	25	18.894	.002
	30	22.672	.003
For latitude 3°	5	3.779	0.000
	10	7.558	.001
	15	11.336	.001
	20	15.115	.002
	25	18.894	.004
	30	22.673	.005
For latitude 4°	5	3.779	0.000
	10	7.558	.001
	15	11.337	.002
	20	15.115	.003
	25	18.894	.005
	30	22.673	.007
For latitude 5°	5	3.779	0.000
	10	7.558	.001
	15	11.337	.002
	20	15.116	.004
	25	18.895	.006
	30	22.674	.009
For latitude 6°	5	3.779	0.000
	10	7.558	.001
	15	11.337	.003
	20	15.116	.005
	25	18.896	.007
	30	22.675	.010
For latitude 7°	5	3.779	0.000
	10	7.559	.001
	15	11.338	.003
	20	15.117	.005
	25	18.896	.008
	30	22.676	.012

TABLE 1.—*Coordinates for the projection of maps, scale $\frac{1}{96000}$*—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 5′	10′	15′	20′	30′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
7 00	3.776	7.552	11.329	15.105	22.658
10	.775	.550	.325	.100	.649
15	.774	.548	.323	.097	.645
20	.774	.547	.321	.094	.641
30	3.772	7.544	11.316	15.088	22.633
40	.771	.541	.312	.083	.624
45	.770	.540	.310	.080	.619
50	.769	.538	.307	.077	.615
8 00	3.768	7.535	11.303	15.071	22.606
10	.766	.532	.298	.064	.597
15	.765	.531	.296	.061	.592
20	.765	.529	.294	.058	.587
30	3.763	7.526	11.289	15.052	22.577
40	.761	.522	.284	.045	.568
45	.760	.521	.281	.042	.563
50	.760	.519	.279	.038	.558
9 00	3.758	7.516	11.274	15.032	22.547
10	.756	.512	.268	.025	.537
15	.755	.511	.266	.021	.532
20	.754	.509	.263	.018	.526
30	3.753	7.505	11.258	15.010	22.516
40	.751	.502	.252	.003	.505
45	.750	.500	.249	14.999	.499
50	.749	.498	.247	.996	.493
10 00	3.747	7.494	11.241	14.988	22.482
10	.745	.490	.235	.980	.470
15	.744	.488	.232	.976	.465
20	.743	.486	.229	.973	.459
30	3.741	7.482	11.223	14.965	22.447
40	.739	.478	.217	.956	.435
45	.738	.476	.214	.952	.429
50	.737	.474	.211	.948	.422
11 00	3.735	7.470	11.205	14.940	22.410
10	.733	.466	.199	.931	.397
15	.732	.464	.195	.927	.391
20	.731	.461	.192	.923	.384
30	3.729	7.457	11.186	14.914	22.371
40	.726	.453	.179	.905	.358
45	.725	.450	.176	.901	.351
50	.724	.448	.172	.896	.345
12 00	3.722	7.444	11.165	14.887	22.331
10	.720	.439	.159	.878	.317
15	.718	.437	.155	.873	.310
20	.717	.434	.152	.869	.303
30	3.715	7.430	11.145	14.859	22.289
40	.712	.425	.137	.850	.275
45	.711	.422	.134	.845	.267
50	.710	.420	.130	.840	.260
13 00	3.708	7.415	11.123	14.830	22.245
10	.705	.410	.115	.820	.230
15	.704	.408	.111	.815	.223
20	.703	.405	.108	.810	.215
30	3.700	7.400	11.100	14.800	22.200
40	.697	.395	.092	.790	.184
45	.696	.392	.088	.784	.177
50	.695	.390	.084	.779	.169
14 00	3.692	7.384	11.077	14.769	22.153

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 7°	5	3.779	0.000
	10	7.559	.001
	15	11.338	.003
	20	15.117	.005
	25	18.896	.008
	30	22.676	.012
For latitude 8°	5	3.779	0.000
	10	7.559	.001
	15	11.338	.003
	20	15.118	.006
	25	18.897	.010
	30	22.677	.014
For latitude 9°	5	3.780	0.000
	10	7.559	.002
	15	11.339	.004
	20	15.119	.007
	25	18.898	.011
	30	22.678	.015
For latitude 10°	5	3.780	0.000
	10	7.560	.002
	15	11.340	.004
	20	15.119	.008
	25	18.899	.012
	30	22.679	.017
For latitude 11°	5	3.780	0.001
	10	7.560	.002
	15	11.340	.005
	20	15.120	.008
	25	18.901	.013
	30	22.681	.019
For latitude 12°	5	3.780	0.001
	10	7.561	.002
	15	11.341	.005
	20	15.122	.009
	25	18.902	.014
	30	22.682	.020
For latitude 13°	5	3.781	0.001
	10	7.561	.002
	15	11.342	.005
	20	15.123	.010
	25	18.903	.015
	30	22.684	.022
For latitude 14°	5	3.781	0.001
	10	7.562	.003
	15	11.343	.006
	20	15.124	.010
	25	18.905	.016
	30	22.686	.023

TABLE 1.—*Coordinates for the projection of maps, scale* $\frac{1}{96000}$—Continued

Latitude of parallel		Abscissas of developed parallel				
		Longitude interval				
		5′	10′	15′	20′	30′
°	′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
14	00	3.692	7.384	11.077	14.769	22.153
	10	.689	.379	.068	.758	.137
	15	.688	.376	.064	.752	.129
	20	.687	.374	.060	.747	.121
	30	3.684	7.368	11.052	14.736	22.104
	40	.681	.363	.044	.725	.088
	45	.680	.360	.040	.719	.079
	50	.678	.357	.035	.714	.071
15	00	3.676	7.351	11.027	14.702	22.054
	10	.673	.346	.018	.691	.037
	15	.671	.343	.014	.685	.028
	20	.670	.340	.010	.679	.019
	30	3.667	7.334	11.001	14.668	22.002
	40	.664	.328	10.992	.656	21.984
	45	.662	.325	.987	.650	.975
	50	.661	.322	.983	.644	.966
16	00	3.658	7.316	10.974	14.632	21.948
	10	.655	.310	.965	.620	.930
	15	.653	.307	.960	.614	.920
	20	.652	.304	.956	.607	.911
	30	3.649	7.297	10.946	14.595	21.893
	40	.646	.291	.937	.582	.874
	45	.644	.288	.932	.576	.864
	50	.642	.285	.927	.570	.855
17	00	3.639	7.278	10.918	14.557	21.835
	10	.636	.272	.908	.544	.816
	15	.634	.269	.903	.538	.806
	20	.633	.265	.898	.531	.796
	30	3.629	7.259	10.888	14.518	21.777
	40	.626	.252	.878	.505	.757
	45	.624	.249	.873	.498	.747
	50	.623	.246	.868	.491	.737
18	00	3.619	7.239	10.858	14.478	21.716
	10	.616	.232	.848	.464	.696
	15	.614	.228	.843	.457	.686
	20	.613	.225	.838	.450	.675
	30	3.609	7.218	10.827	14.436	21.654
	40	.606	.211	.817	.422	.633
	45	.604	.208	.811	.415	.623
	50	.602	.204	.806	.408	.612
19	00	3.598	7.197	10.795	14.394	21.591
	10	.595	.190	.785	.379	.569
	15	.593	.186	.779	.372	.558
	20	.591	.182	.774	.365	.547
	30	3.588	7.175	10.763	14.350	21.525
	40	.584	.168	.752	.335	.503
	45	.582	.164	.746	.328	.492
	50	.580	.160	.741	.321	.481
20	00	3.576	7.153	10.729	14.306	21.458
	10	.573	.145	.718	.290	.436
	15	.571	.141	.712	.283	.424
	20	.569	.138	.706	.275	.413
	30	3.565	7.130	10.695	14.260	21.390
	40	.561	.122	.683	.244	.367
	45	.559	.118	.678	.237	.355
	50	.557	.114	.672	.229	.343
21	00	3.553	7.107	10.660	14.213	21.320

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 14°	5	3.781	0.001
	10	7.562	.003
	15	11.343	.006
	20	15.124	.010
	25	18.905	.016
	30	22.686	.023
For latitude 15°	5	3.781	0.001
	10	7.563	.003
	15	11.344	.006
	20	15.125	.011
	25	18.907	.017
	30	22.688	.025
For latitude 16°	5	3.782	0.001
	10	7.563	.003
	15	11.345	.007
	20	15.127	.012
	25	18.908	.018
	30	22.690	.026
For latitude 17°	5	3.782	0.001
	10	7.564	.003
	15	11.346	.007
	20	15.128	.012
	25	18.910	.019
	30	22.692	.028
For latitude 18°	5	3.782	0.001
	10	7.565	.003
	15	11.347	.007
	20	15.130	.013
	25	18.912	.020
	30	22.694	.029
For latitude 19°	5	3.783	0.001
	10	7.566	.003
	15	11.348	.008
	20	15.131	.014
	25	18.914	.021
	30	22.697	.031
For latitude 20°	5	3.783	0.001
	10	7.566	.004
	15	11.350	.008
	20	15.133	.014
	25	18.916	.022
	30	22.700	.032
For latitude 21°	5	3.784	0.001
	10	7.567	.004
	15	11.351	.008
	20	15.135	.015
	25	18.919	.023
	30	22.702	.033

TABLE 1.—*Coordinates for the projection of maps, scale $\frac{1}{500000}$*—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 5′	10′	15′	20′	30′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
21 00	3.553	7.107	10.660	14.213	21.320
10	.549	.099	.648	.197	.296
15	.547	.095	.642	.189	.284
20	.545	.091	.636	.181	.272
30	3.541	7.083	10.624	14.165	21.248
40	.537	.075	.612	.149	.224
45	.535	.070	.606	.141	.211
50	.533	.066	.600	.133	.199
22 00	3.529	7.058	10.587	14.116	21.174
10	.525	.050	.575	.100	.150
15	.523	.046	.569	.091	.137
20	.521	.042	.562	.083	.125
30	3.517	7.033	10.550	14.066	21.099
40	.512	.025	.537	.049	.074
45	.510	.020	.531	.041	.061
50	.508	.016	.524	.032	.049
23 00	3.504	7.008	10.511	14.015	21.023
10	.499	6.999	.498	13.998	20.997
15	.497	.995	.492	.989	.984
20	.495	.990	.485	.981	.971
30	3.491	6.982	10.472	13.963	20.945
40	.486	.973	.459	.945	.918
45	.484	.968	.452	.937	.905
50	.482	.964	.446	.928	.892
24 00	3.477	6.955	10.432	13.910	20.865
10	.473	.946	.419	.892	.838
15	.471	.941	.412	.883	.824
20	.468	.937	.405	.874	.811
30	3.464	6.928	10.392	13.856	20.783
40	.459	.919	.378	.837	.756
45	.457	.914	.371	.828	.742
50	.455	.909	.364	.819	.728
25 00	3.450	6.900	10.350	13.800	20.700
10	.445	.891	.336	.782	.672
15	.443	.886	.329	.772	.658
20	.441	.881	.322	.763	.644
30	3.436	6.872	10.308	13.744	20.616
40	.431	.862	.294	.725	.587
45	.429	.858	.286	.715	.573
50	.426	.853	.279	.706	.559
26 00	3.422	6.843	10.265	13.686	20.530
10	.417	.834	.250	.667	.501
15	.414	.829	.243	.657	.486
20	.412	.824	.236	.648	.471
30	3.407	6.814	10.221	13.628	20.442
40	.402	.804	.206	.608	.412
45	.400	.799	.199	.598	.398
50	.397	.794	.191	.588	.383
27 00	3.392	6.784	10.176	13.569	20.353
10	.387	.774	.161	.548	.323
15	.385	.769	.154	.538	.308
20	.382	.764	.146	.528	.292
30	3.377	6.754	10.131	13.508	20.262
40	.372	.744	.116	.488	.231
45	.369	.739	.108	.477	.216
50	.367	.734	.100	.467	.201
28 00	3.362	6.723	10.085	13.446	20.170

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 21°	5	3.784	0.001
	10	7.567	.004
	15	11.351	.008
	20	15.135	.015
	25	18.919	.023
	30	22.702	.033
For latitude 22°	5	3.704	0.001
	10	7.568	.004
	15	11.352	.009
	20	15.137	.015
	25	18.921	.024
	30	22.705	.035
For latitude 23°	5	3.785	0.001
	10	7.569	.004
	15	11.354	.009
	20	15.138	.016
	25	18.923	.025
	30	22.708	.036
For latitude 24°	5	3.785	0.001
	10	7.570	.004
	15	11.355	.009
	20	15.140	.016
	25	18.926	.026
	30	22.711	.037
For latitude 25°	5	3.786	0.001
	10	7.571	.004
	15	11.357	.010
	20	15.142	.017
	25	18.928	.026
	30	22.714	.038
For latitude 26°	5	3.786	0.001
	10	7.572	.004
	15	11.358	.010
	20	15.144	.017
	25	18.930	.027
	30	22.716	.039
For latitude 27°	5	3.787	0.001
	10	7.573	.004
	15	11.360	.010
	20	15.147	.018
	25	18.934	.028
	30	22.720	.040
For latitude 28°	5	3.787	0.001
	10	7.574	.005
	15	11.362	.010
	20	15.149	.018
	25	18.936	.029
	30	22.724	.041

TABLE 1.—*Coordinates for the projection of maps, scale $\frac{1}{96000}$*—Continued

Latitude of parallel	Abscissas of developed parallel				
	Longitude interval				
	5′	10′	15′	20′	30′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
28 00	3.362	6.723	10.085	13.446	20.170
10	.356	.713	.069	.426	.139
15	.354	.708	.061	.415	.123
20	.351	.702	.054	.405	.107
30	3.346	6.692	10.038	13.384	20.076
40	.341	.681	.022	.363	.044
45	.338	.676	.014	.352	.028
50	.335	.671	10.006	.342	20.012
29 00	3.330	6.660	9.990	13.320	19.980
10	.325	.649	.974	.299	.948
15	.322	.644	.966	.288	.932
20	.319	.639	.958	.277	.916
30	3.314	6.628	9.942	13.256	19.884
40	.308	.617	.925	.234	.851
45	.306	.611	.917	.223	.835
50	.303	.606	.909	.212	.818
30 00	3.298	6.595	9.893	13.190	19.785
10	.292	.584	.876	.168	.752
15	.289	.578	.868	.157	.735
20	.286	.573	.859	.146	.719
30	3.281	6.562	9.843	13.123	19.685
40	.275	.551	.826	.101	.652
45	.272	.545	.817	.090	.635
50	.270	.539	.809	.078	.618
31 00	3.264	6.528	9.792	13.056	19.584
10	.258	.517	.775	.033	.550
15	.255	.511	.766	.022	.532
20	.253	.505	.758	13.010	.515
30	3.247	6.494	9.740	12.987	19.481
40	.241	.482	.723	.964	.446
45	.238	.476	.714	.953	.429
50	.235	.470	.706	.941	.411
32 00	3.229	6.459	9.688	12.918	19.376
10	.224	.447	.671	.894	.341
15	.221	.441	.662	.882	.324
20	.218	.435	.653	.871	.307
30	3.212	6.424	9.635	12.847	19.271
40	.206	.412	.617	.823	.235
45	.203	.406	.608	.811	.217
50	.200	.400	.600	.799	.199
33 00	3.194	6.388	9.582	12.775	19.163
10	.188	.376	.564	.751	.127
15	.185	.370	.554	.739	.109
20	.182	.364	.545	.727	.091
30	3.176	6.351	9.527	12.703	19.054
40	.170	.339	.509	.679	19.018
45	.167	.333	.500	.666	18.999
50	.164	.327	.491	.654	.981
34 00	3.157	6.315	9.472	12.629	18.944
10	.151	.302	.453	.605	.907
15	.148	.296	.444	.592	.888
20	.145	.290	.435	.580	.870
30	3.139	6.277	9.416	12.555	18.832
40	.132	.265	.397	.530	.795
45	.129	.259	.388	.517	.776
50	.126	.252	.379	.505	.757
35 00	3.120	6.240	9.360	12.480	18.719

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 28°	5	3.787	0.001
	10	7.574	.005
	15	11.362	.010
	20	15.149	.018
	25	18.936	.029
	30	22.724	.041
For latitude 29°	5	3.788	0.001
	10	7.576	.005
	15	11.363	.011
	20	15.151	.019
	25	18.939	.029
	30	22.727	.042
For latitude 30°	5	3.788	0.001
	10	7.577	.005
	15	11.365	.011
	20	15.154	.019
	25	18.942	.030
	30	22.731	.043
For latitude 31°	5	3.789	0.001
	10	7.578	.005
	15	11.367	.011
	20	15.156	.020
	25	18.945	.031
	30	22.734	.044
For latitude 32°	5	3.789	0.001
	10	7.579	.005
	15	11.369	.011
	20	15.158	.020
	25	18.948	.031
	30	22.738	.045
For latitude 33°	5	3.790	0.001
	10	7.580	.005
	15	11.370	.011
	20	15.161	.020
	25	18.951	.032
	30	22.741	.046
For latitude 34°	5	3.791	0.001
	10	7.582	.005
	15	11.372	.012
	20	15.163	.021
	25	18.954	.032
	30	22.745	.046
For latitude 35°	5	3.791	0.001
	10	7.583	.005
	15	11.374	.012
	20	15.166	.021
	25	18.957	.033
	30	22.749	.047

TABLE 1.—*Coordinates for the projection of maps, scale $\frac{1}{62500}$*—Continued

Latitude of parallel	Abscissas of developed parallel				
	Longitude interval				
	5′	10′	15′	20′	30′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
35 00	3.120	6.240	9.360	12.480	18.719
10	.114	.227	.341	.454	.681
15	.110	.221	.331	.441	.662
20	.107	.214	.321	.429	.643
30	3.101	6.202	9.302	12.403	18.605
40	.094	.189	.283	.377	.566
45	.091	.182	.273	.365	.547
50	.088	.176	.264	.352	.528
36 00	3.081	6.163	9.244	12.326	18.489
10	.075	.150	.225	.300	.450
15	.072	.143	.215	.287	.430
20	.068	.137	.205	.274	.411
30	3.062	6.124	9.186	12.248	18.371
40	.055	.111	.166	.221	.332
45	.052	.104	.156	.208	.312
50	.049	.097	.146	.195	.292
37 00	3.042	6.084	9.126	12.168	18.252
10	.035	.071	.106	.142	.213
15	.032	.064	.096	.128	.193
20	.029	.057	.086	.115	.172
30	3.022	6.044	9.066	12.088	18.132
40	.015	.031	.046	.061	.092
45	.012	.024	.036	.048	.072
50	.009	.017	.026	.034	.051
38 00	3.002	6.004	9.005	12.007	18.011
10	2.995	5.990	8.985	11.980	17.970
15	.992	.983	.975	.966	.949
20	.988	.976	.964	.953	.929
30	2.982	5.963	8.944	11.925	17.888
40	.974	.949	.923	.898	.846
45	.971	.942	.913	.884	.826
50	.968	.935	.903	.870	.805
39 00	2.961	5.921	8.882	11.842	17.763
10	.954	.907	.861	.814	.722
15	.950	.900	.850	.800	.701
20	.947	.893	.840	.786	.680
30	2.940	5.879	8.819	11.758	17.638
40	.933	.865	.798	.730	.595
45	.929	.858	.787	.716	.574
50	.926	.851	.777	.702	.553
40 00	2.918	5.837	8.755	11.674	17.511
10	.911	.823	.734	.645	.468
15	.908	.816	.723	.631	.447
20	.904	.808	.713	.617	.425
30	2.897	5.794	8.691	11.588	17.382
40	.890	.780	.670	.559	.339
45	.886	.773	.659	.545	.318
50	.883	.765	.648	.531	.296
41 00	2.875	5.751	8.626	11.502	17.253
10	.868	.736	.605	.473	.209
15	.864	.729	.594	.458	.187
20	.861	.722	.583	.444	.165
30	2.854	5.707	8.561	11.414	17.122
40	.846	.692	.539	.385	.078
45	.843	.685	.528	.370	.056
50	.839	.678	.517	.356	.033
42 00	2.832	5.663	8.495	11.326	16.989

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 35°	5	3.791	0.001
	10	7.583	.005
	15	11.374	.012
	20	15.166	.021
	25	18.957	.033
	30	22.749	.047
For latitude 36°	5	3.792	0.001
	10	7.584	.005
	15	11.376	.012
	20	15.168	.021
	25	18.961	.033
	30	22.752	.047
For latitude 37°	5	3.793	0.001
	10	7.585	.005
	15	11.378	.012
	20	15.171	.021
	25	18.964	.033
	30	22.757	.048
For latitude 38°	5	3.793	0.001
	10	7.587	.005
	15	11.380	.012
	20	15.173	.021
	25	18.967	.034
	30	22.761	.048
For latitude 39°	5	3.794	0.001
	10	7.588	.005
	15	11.382	.012
	20	15.176	.022
	25	18.970	.034
	30	22.765	.049
For latitude 40°	5	3.795	0.001
	10	7.589	.005
	15	11.384	.012
	20	15.179	.022
	25	18.974	.034
	30	22.768	.049
For latitude 41°	5	3.795	0.001
	10	7.591	.005
	15	11.386	.012
	20	15.181	.022
	25	18.977	.034
	30	22.772	.049
For latitude 42°	5	3.796	0.001
	10	7.592	.005
	15	11.388	.012
	20	15.184	.022
	25	18.980	.034
	30	22.776	.050

TABLE 1.—*Coordinates for the projection of maps, scale* $\frac{1}{96000}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 5′	10′	15′	20′	30′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
42 00	2.832	5.663	8.495	11.326	16.989
10	.824	.648	.472	.297	.945
15	.820	.641	.461	.282	.923
20	.817	.633	.450	.267	.900
30	2.809	5.619	8.428	11.237	16.856
40	.802	.604	.405	.207	.811
45	.798	.596	.394	.192	.788
50	.794	.589	.383	.177	.766
43 00	2.787	5.574	8.360	11.147	16.721
10	.779	.558	.338	.117	.675
15	.775	.551	.326	.102	.653
20	.772	.543	.315	.087	.630
30	2.764	5.528	8.292	11.056	16.584
40	.756	.513	.269	.026	.539
45	.753	.505	.258	11.011	.516
50	.749	.498	.246	10.995	.493
44 00	2.741	5.482	8.223	10.965	16.447
10	.733	.467	.200	.934	.401
15	.730	.459	.189	.918	.378
20	.726	.452	.177	.903	.355
30	2.718	5.436	8.154	10.872	16.308
40	.710	.421	.131	.841	.262
45	.706	.413	.119	.826	.238
50	.703	.405	.108	.810	.215
45 00	2.695	5.389	8.084	10.779	16.168
10	.687	.374	.061	.747	.121
15	.683	.366	.049	.732	.098
20	.679	.358	.037	.716	.074
30	2.671	5.342	8.014	10.685	16.027
40	.663	.327	7.990	.653	15.980
45	.659	.319	.978	.637	.956
50	.655	.311	.966	.621	.932
46 00	2.647	5.295	7.942	10.590	15.884
10	.639	.279	.918	.558	.837
15	.635	.271	.906	.542	.813
20	.631	.263	.894	.526	.789
30	2.623	5.247	7.870	10.494	15.741
40	.615	.231	.846	.462	.693
45	.611	.223	.834	.446	.669
50	.607	.215	.822	.430	.644
47 00	2.599	5.199	7.798	10.397	15.596
10	.591	.182	.774	.365	.547
15	.587	.174	.762	.349	.523
20	.583	.166	.749	.332	.499
30	2.575	5.150	7.725	10.300	15.450
40	.567	.134	.700	.267	.401
45	.563	.125	.688	.251	.376
50	.559	.117	.676	.235	.352
48 00	2.550	5.101	7.651	10.202	15.303
10	.542	.084	.627	.169	.253
15	.538	.076	.614	.152	.228
20	.534	.068	.602	.136	.204
30	2.526	5.051	7.577	10.103	15.154
40	.517	.035	.552	.070	.104
45	.513	.026	.540	.053	.079
50	.509	.018	.527	.036	.055
49 00	2.501	5.001	7.502	10.003	15.005

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 42°	5	3.796	0.001
	10	7.592	.005
	15	11.388	.012
	20	15.184	.022
	25	18.980	.034
	30	22.776	.050
For latitude 43°	5	3.797	0.001
	10	7.593	.006
	15	11.390	.012
	20	15.187	.022
	25	18.984	.035
	30	22.781	.050
For latitude 44°	5	3.797	0.001
	10	7.595	.006
	15	11.392	.012
	20	15.189	.022
	25	18.987	.035
	30	22.785	.050
For latitude 45°	5	3.798	0.001
	10	7.596	.006
	15	11.394	.012
	20	15.192	.022
	25	18.990	.035
	30	22.789	.050
For latitude 46°	5	3.799	0.001
	10	7.597	.006
	15	11.396	.012
	20	15.195	.022
	25	18.994	.035
	30	22.793	.050
For latitude 47°	5	3.799	0.001
	10	7.599	.006
	15	11.398	.012
	20	15.198	.022
	25	18.997	.035
	30	22.797	.050
For latitude 48°	5	3.800	0.001
	10	7.600	.005
	15	11.400	.012
	20	15.200	.022
	25	19.000	.034
	30	22.801	.050
For latitude 49°	5	3.801	0.001
	10	7.601	.005
	15	11.402	.012
	20	15.203	.022
	25	19.004	.034
	30	22.805	.049

TABLE 1.—*Coordinates for the projection of maps, scale $\frac{1}{96000}$*—Continued

Latitude of parallel		Abscissas of developed parallel — Longitude interval 5′	10′	15′	20′	30′
°	′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
49	00	2.501	5.001	7.502	10.003	15.005
	10	.492	4.985	.477	9.970	14.954
	15	.488	.976	.465	.953	.929
	20	.484	.968	.452	.936	.904
	30	2.476	4.951	7.427	9.902	14.854
	40	.467	.934	.402	.869	.803
	45	.463	.926	.389	.852	.778
	50	.459	.918	.376	.835	.753
50	00	2.450	4.901	7.351	9.801	14.702
	10	.442	.884	.326	.767	.651
	15	.438	.875	.313	.750	.625
	20	.433	.867	.300	.733	.600
	30	2.425	4.850	7.274	9.699	14.549
	40	.416	.833	.249	.665	.498
	45	.412	.824	.236	.648	.472
	50	.408	.815	.223	.631	.446
51	00	2.399	4.798	7.197	9.596	14.395
	10	.391	.781	.172	.562	.343
	15	.386	.772	.159	.545	.317
	20	.382	.764	.146	.528	.291
	30	2.373	4.746	7.120	9.493	14.239
	40	.365	.729	.094	.458	.187
	45	.360	.720	.081	.441	.161
	50	.356	.712	.068	.424	.135
52	00	2.347	4.694	7.042	9.389	14.083
	10	.338	.677	.015	.353	.031
	15	.334	.668	7.002	.336	14.004
	20	.330	.659	6.989	.319	13.978
	30	2.321	4.642	6.963	9.284	13.926
	40	.312	.624	.936	.249	.873
	45	.308	.615	.923	.231	.846
	50	.303	.607	.910	.213	.820
53	00	2.295	4.589	6.884	9.178	13.767
	10	.286	.571	.857	.143	.714
	15	.281	.562	.844	.125	.687
	20	.277	.554	.830	.107	.661
	30	2.268	4.536	6.804	9.072	13.607
	40	.259	.518	.777	.036	.554
	45	.255	.509	.764	.018	.527
	50	.250	.500	.750	9.000	.500
54	00	2.241	4.482	6.723	8.965	13.447
	10	.232	.464	.697	.929	.393
	15	.228	.455	.683	.911	.366
	20	.223	.446	.670	.893	.339
	30	2.214	4.428	6.643	8.857	13.285
	40	.205	.410	.616	.821	.231
	45	.201	.401	.602	.803	.204
	50	.196	.392	.588	.785	.177
55	00	2.187	4.374	6.561	8.748	13.122
	10	.178	.356	.534	.712	.068
	15	.173	.347	.520	.694	.041
	20	.169	.338	.507	.676	13.013
	30	2.160	4.320	6.479	8.639	12.959
	40	.151	.301	.452	.603	.904
	45	.146	.292	.438	.584	.877
	50	.142	.283	.425	.566	.849
56	00	2.132	4.265	6.397	8.529	12.794

Ordinates of developed parallel and meridional distances

Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 49°	5	3.801	0.001
	10	7.601	.005
	15	11.402	.012
	20	15.203	.022
	25	19.004	.034
	30	22.805	.049
For latitude 50°	5	3.801	0.001
	10	7.603	.005
	15	11.404	.012
	20	15.206	.022
	25	19.007	.034
	30	22.809	.049
For latitude 51°	5	3.802	0.001
	10	7.604	.005
	15	11.406	.012
	20	15.208	.022
	25	19.011	.034
	30	22.813	.049
For latitude 52°	5	3.803	0.001
	10	7.605	.005
	15	11.408	.012
	20	15.211	.022
	25	19.014	.034
	30	22.817	.048
For latitude 53°	5	3.803	0.001
	10	7.607	.005
	15	11.410	.012
	20	15.214	.021
	25	19.017	.033
	30	22.821	.048
For latitude 54°	5	3.804	0.001
	10	7.608	.005
	15	11.412	.012
	20	15.216	.021
	25	19.020	.033
	30	22.824	.047
For latitude 55°	5	3.805	0.001
	10	7.609	.005
	15	11.414	.012
	20	15.219	.021
	25	19.024	.033
	30	22.828	.047
For latitude 56°	5	3.805	0.001
	10	7.611	.005
	15	11.416	.012
	20	15.221	.021
	25	19.027	.032
	30	22.832	.046

TABLE 2.—*Coordinates for the projection of maps, scale* $\frac{1}{48000}$

Latitude of parallel	Abscissas of developed parallel				
	Longitude interval				
	2½′	5′	7½′	10′	15′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
0 00	3.804	7.609	11.413	15.218	22.827
05	.804	.609	.413	.218	.827
07½	.804	.609	.413	.218	.826
10	.804	.609	.413	.218	.826
15	3.804	7.609	11.413	15.218	22.826
20	.804	.609	.413	.217	.826
22½	.804	.609	.413	.217	.826
25	.804	.609	.413	.217	.826
30	3.804	7.609	11.413	15.217	22.826
35	.804	.608	.413	.217	.825
37½	.804	.608	.413	.217	.825
40	.804	.608	.413	.217	.825
45	3.804	7.608	11.412	15.216	22.825
50	.804	.608	.412	.216	.824
52½	.804	.608	.412	.216	.824
55	.804	.608	.412	.216	.824
1 00	3.804	7.608	11.412	15.215	22.823
05	.804	.608	.411	.215	.822
07½	.804	.607	.411	.215	.822
10	.804	.607	.411	.215	.822
15	3.804	7.607	11.411	15.214	22.821
20	.803	.607	.410	.214	.820
22½	.803	.607	.410	.213	.820
25	.803	.607	.410	.213	.820
30	3.803	7.606	11.409	15.213	22.819
35	.803	.606	.409	.212	.818
37½	.803	.606	.409	.212	.817
40	.803	.606	.408	.211	.817
45	3.803	7.605	11.408	15.211	22.816
50	.802	.605	.407	.210	.815
52½	.802	.605	.407	.210	.814
55	.802	.605	.407	.209	.814
2 00	3.802	7.604	11.407	15.208	22.813
05	.802	.604	.406	.208	.812
07½	.802	.604	.405	.207	.811
10	.802	.603	.405	.207	.810
15	3.802	7.603	11.405	15.206	22.809
20	.801	.603	.404	.205	.808
22½	.801	.602	.404	.205	.807
25	.801	.602	.403	.204	.806
30	3.801	7.602	11.403	15.203	22.805
35	.801	.601	.402	.202	.803
37½	.800	.601	.401	.202	.803
40	.800	.601	.401	.201	.802
45	3.800	7.600	11.400	15.200	22.800
50	.800	.600	.399	.199	.799
52½	.800	.599	.399	.199	.798
55	.799	.599	.398	.198	.797
3 00	3.799	7.598	11.398	15.197	22.795

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 0°	2½	3.779	0.000
	5	7.557	.000
	7½	11.336	.000
	10	15.115	.000
	12½	18.893	.000
	15	22.672	.000
For latitude 1°	2½	3.779	0.000
	5	7.557	.000
	7½	11.336	.000
	10	15.115	.000
	12½	18.893	.001
	15	22.672	.001
For latitude 2°	2½	3.779	0.000
	5	7.557	.000
	7½	11.336	.000
	10	15.115	.001
	12½	18.894	.001
	15	22.672	.002
For latitude 3°	2½	3.779	0.000
	5	7.558	.000
	7½	11.336	.001
	10	15.115	.001
	12½	18.894	.002
	15	22.673	.003

TABLE 2.—*Coordinates for the projection of maps, scale* $\frac{1}{48000}$—Continued

Latitude of parallel	Abscissas of developed parallel				
	Longitude interval				
	2½′	5′	7½′	10′	15′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
3 00	3.799	7.598	11.398	15.197	22.795
05	.799	.598	.397	.196	.794
07½	.799	.598	.396	.195	.793
10	.799	.597	.396	.195	.792
15	3.798	7.597	11.395	15.193	22.790
20	.798	.596	.394	.192	.788
22½	.798	.596	.394	.191	.787
25	.798	.595	.393	.191	.786
30	3.797	7.595	11.392	15.190	22.784
35	.797	.594	.391	.188	.782
37½	.797	.594	.391	.187	.781
40	.797	.593	.390	.187	.780
45	3.796	7.593	11.389	15.185	22.778
50	.796	.592	.388	.184	.776
52½	.796	.592	.387	.183	.775
55	.796	.591	.387	.182	.774
4 00	3.795	7.590	11.386	15.181	22.771
05	.795	.590	.385	.179	.769
07½	.795	.589	.384	.179	.768
10	.794	.589	.383	.178	.767
15	3.794	7.588	11.382	15.176	22.764
20	.794	.587	.382	.174	.762
22½	.793	.587	.380	.174	.760
25	.793	.586	.380	.173	.759
30	3.793	7.586	11.378	15.171	22.757
35	.792	.585	.377	.169	.754
37½	.792	.584	.376	.168	.573
40	.792	.584	.376	.168	.751
45	3.791	7.583	11.374	15.166	22.749
50	.791	.582	.373	.164	.746
52½	.791	.582	.372	.163	.745
55	.791	.581	.372	.162	.743
5 00	3.790	7.580	11.370	15.160	22.740
05	.790	.579	.369	.158	.737
07½	.789	.579	.368	.157	.736
10	.789	.578	.367	.156	.734
15	3.789	7.577	11.366	15.154	22.731
20	.788	.576	.364	.152	.728
22½	.788	.576	.363	.151	.727
25	.788	.575	.363	.150	.725
30	3.787	7.574	11.361	15.148	22.722
35	.786	.573	.359	.146	.719
37½	.786	.572	.359	.145	.717
40	.786	.572	.358	.144	.716
45	3.785	7.571	11.356	15.142	22.712
50	.785	.570	.355	.139	.709
52½	.785	.570	.354	.138	.707
55	.784	.569	.353	.137	.706
6 00	3.784	7.567	11.351	15.135	22.702

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 3°	2½	3.779	0.000
	5	7.558	.000
	7½	11.336	.001
	10	15.115	.001
	12½	18.894	.002
	15	22.673	.003
For latitude 4°	2½	3.779	0.000
	5	7.558	.000
	7½	11.337	.001
	10	15.115	.002
	12½	18.894	.002
	15	22.673	.003
For latitude 5°	2½	3.779	0.000
	5	7.558	.000
	7½	11.337	.001
	10	15.116	.002
	12½	18.895	.003
	15	22.674	.004
For latitude 6°	2½	3.779	0.000
	5	7.558	.001
	7½	11.337	.001
	10	15.116	.002
	12½	18.896	.004
	15	22.675	.005

TABLE 2.—*Coordinates for the projection of maps, scale* $\frac{1}{480000}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 2½′	5′	7½′	10′	15′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
6 00	3.784	7.567	11.351	15.135	22.702
05	.783	.566	.349	.133	.699
07½	.783	.566	.349	.131	.697
10	.783	.565	.348	.130	.695
15	3.782	7.564	11.346	15.128	22.692
20	.781	.563	.344	.125	.688
22½	.781	.562	.343	.124	.686
25	.781	.561	.342	.123	.685
30	3.780	7.560	11.340	15.121	22.681
35	.779	.559	.338	.118	.677
37½	.779	.558	.338	.117	.675
40	.779	.558	.337	.115	.673
45	3.778	7.556	11.335	15.113	22.669
50	.778	.555	.333	.110	.665
52½	.777	.554	.332	.109	.664
55	.777	.554	.331	.108	.662
7 00	3.776	7.552	11.329	15.105	22.658
05	.776	.551	.327	.102	.653
07½	.775	.550	.326	.101	.651
10	.775	.550	.325	.100	.649
15	3.774	7.548	11.323	15.097	22.645
20	.774	.547	.321	.094	.641
22½	.773	.546	.319	.093	.639
25	.773	.546	.318	.091	.637
30	3.772	7.544	11.316	15.088	22.633
35	.771	.543	.314	.085	.628
37½	.771	.542	.313	.084	.626
40	.771	.541	.312	.083	.624
45	3.770	7.540	11.310	15.080	22.619
50	.769	.538	.307	.077	.615
52½	.769	.538	.306	.075	.613
55	.768	.537	.305	.074	.610
8 00	3.768	7.535	11.303	15.071	22.606
05	.767	.534	.301	.068	.601
07½	.766	.533	.299	.066	.599
10	.766	.532	.298	.064	.597
15	3.765	7.531	11.296	15.061	22.592
20	.765	.529	.294	.058	.587
22½	.764	.528	.292	.056	.585
25	.764	.527	.291	.055	.582
30	3.763	7.526	11.289	15.052	22.577
35	.762	.524	.286	.048	.573
37½	.762	.523	.285	.047	.570
40	.761	.522	.284	.045	.568
45	3.760	7.521	11.281	15.042	22.563
50	.760	.519	.279	.038	.558
52½	.759	.518	.277	.037	.555
55	.758	.517	.276	.035	.553
9 00	3.758	7.516	11.274	15.032	22.547

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 6°	2½	3.779	0.000
	5	7.558	.001
	7½	11.337	.001
	10	15.116	.002
	12½	18.896	.004
	15	22.675	.005
For latitude 7°	2½	3.779	0.000
	5	7.559	.001
	7½	11.338	.001
	10	15.117	.003
	12½	18.896	.004
	15	22.676	.006
For latitude 8°	2½	3.779	0.000
	5	7.559	.001
	7½	11.338	.002
	10	15.118	.003
	12½	18.897	.005
	15	22.677	.007
For latitude 9°	2½	3.780	0.000
	5	7.559	.001
	7½	11.339	.002
	10	15.118	.003
	12½	18.898	.005
	15	22.678	.008

TABLE 2.—*Coordinates for the projection of maps, scale* $\frac{1}{48000}$—Continued

Latitude of parallel	Abscissas of developed parallel				
	Longitude interval				
	2½′	5′	7½′	10′	15′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
9 00	3.758	7.516	11.274	15.032	22.547
05	.757	.514	.271	.028	.542
07½	.757	.513	.270	.026	.540
10	.756	.512	.268	.025	.537
15	3.755	7.511	11.266	15.021	22.532
20	.754	.509	.263	.018	.526
22½	.754	.508	.262	.016	.524
25	.753	.507	.260	.014	.521
30	3.753	7.505	11.258	15.010	22.516
35	.752	.503	.255	.007	.510
37½	.751	.502	.254	.005	.507
40	.751	.502	.252	.003	.505
45	3.750	7.500	11.249	14.999	22.499
50	.749	.498	.247	.996	.493
52½	.748	.497	.245	.994	.491
55	.748	.496	.244	.992	.488
10 00	3.747	7.494	11.241	14.988	22.482
05	.746	.492	.238	.984	.476
07½	.746	.491	.237	.982	.473
10	.745	.490	.235	.980	.470
15	3.744	7.488	11.232	14.976	22.465
20	.743	.486	.229	.973	.459
22½	.743	.485	.228	.971	.456
25	.742	.484	.226	.969	.453
30	3.741	7.482	11.223	14.965	22.447
35	.740	.480	.220	.961	.441
37½	.740	.479	.219	.959	.438
40	.739	.478	.217	.956	.435
45	3.738	7.476	11.214	14.952	22.429
50	.737	.474	.211	.948	.422
52½	.737	.473	.210	.946	.419
55	.736	.472	.208	.944	.416
11 00	3.735	7.470	11.205	14.940	22.410
05	.734	.468	.202	.936	.404
07½	.733	.467	.200	.934	.400
10	.733	.466	.199	.931	.397
15	3.732	7.464	11.195	14.927	22.391
20	.731	.461	.192	.923	.384
22½	.730	.460	.191	.921	.381
25	.730	.459	.189	.919	.378
30	3.729	7.457	11.186	14.914	22.371
35	.727	.455	.182	.910	.365
37½	.727	.454	.181	.908	.361
40	.726	.453	.179	.905	.358
45	3.725	7.450	11.176	14.901	22.351
50	.724	.448	.172	.896	.345
52½	.724	.447	.171	.894	.341
55	.723	.446	.169	.892	.338
12 00	3.722	7.444	11.165	14.887	22.331

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 9°	2½	3.780	0.000
	5	7.559	.001
	7½	11.339	.002
	10	15.118	.003
	12½	18.898	.005
	15	22.678	.008
For latitude 10°	2½	3.780	0.000
	5	7.560	.001
	7½	11.340	.002
	10	15.119	.004
	12½	18.899	.006
	15	22.679	.009
For latitude 11°	2½	3.780	0.000
	5	7.560	.001
	7½	11.340	.002
	10	15.120	.004
	12½	18.901	.006
	15	22.681	.009
For latitude 12°	2½	3.780	0.000
	5	7.561	.001
	7½	11.341	.003
	10	15.121	.005
	12½	18.902	.007
	15	11.682	.010

TABLE 2.—*Coordinates for the projection of maps, scale* $\frac{1}{48000}$—Continued

Latitude of parallel	Abscissas of developed parallel				
	Longitude interval				
	2½′	5′	7½′	10′	15′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
12 00	3.722	7.444	11.165	14.887	22.331
05	.721	.441	.162	.883	.324
07½	.720	.440	.160	.880	.321
10	.720	.439	.159	.878	.317
15	3.718	7.437	11.155	14.873	22.310
20	.717	.434	.152	.869	.303
22½	.717	.433	.150	.866	.300
25	.716	.432	.148	.864	.296
30	3.715	7.430	11.145	14.859	22.289
35	.714	.427	.141	.855	.282
37½	.713	.426	.139	.852	.278
40	.712	.425	.137	.850	.275
45	3.711	7.422	11.134	14.845	22.267
50	.710	.420	.130	.840	.260
52½	.709	.419	.128	.838	.256
55	.709	.418	.126	.835	.253
13 00	3.708	7.415	11.123	14.830	22.245
05	.706	.413	.119	.825	.238
07½	.706	.411	.117	.823	.234
10	.705	.410	.115	.820	.230
15	3.704	7.408	11.111	14.815	22.223
20	.703	.405	.108	.810	.215
22½	.702	.404	.106	.808	.211
25	.701	.403	.104	.805	.208
30	3.700	7.400	11.100	14.800	22.200
35	.699	.397	.096	.795	.192
37½	.698	.396	.094	.792	.188
40	.697	.395	.092	.790	.184
45	3.696	7.392	11.088	14.784	22.177
50	.695	.390	.084	.779	.169
52½	.694	.388	.082	.777	.165
55	.693	.387	.080	.774	.161
14 00	3.692	7.384	11.077	14.769	22.153
05	.691	.382	.072	.763	.145
07½	.690	.380	.070	.761	.141
10	.689	.379	.068	.758	.137
15	3.688	7.376	11.064	14.752	22.129
20	.687	.374	.060	.747	.121
22½	.686	.372	.058	.744	.116
25	.685	.371	.056	.742	.112
30	3.684	7.368	11.052	14.736	22.104
35	.683	.365	.048	.731	.096
37½	.682	.364	.046	.728	.092
40	.681	.363	.044	.725	.088
45	3.680	7.360	11.040	14.719	22.079
50	.678	.357	.035	.714	.071
52½	.670	.356	.033	.711	.066
55	.677	.354	.031	.708	.062
15 00	3.676	7.351	11.027	14.702	22.054

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 12°	2½	3.780	0.000
	5	7.561	.001
	7½	11.341	.003
	10	15.121	.005
	12½	18.902	.007
	15	22.682	.010
For latitude 13°	2½	3.781	0.000
	5	7.561	.001
	7½	11.342	.003
	10	15.123	.005
	12½	18.903	.008
	15	22.684	.011
For latitude 14°	2½	3.781	0.000
	5	7.562	.001
	7½	11.343	.003
	10	15.124	.005
	12½	18.905	.008
	15	22.686	.012
For latitude 15°	2½	3.781	0.000
	5	7.562	.001
	7½	11.344	.003
	10	15.125	.006
	12½	18.907	.009
	15	22.688	.012

TABLE 2.—*Coordinates for the projection of maps, scale* $\frac{1}{48000}$—Continued

Latitude of parallel		Abscissas of developed parallel — Longitude interval				
		2½′	5′	7½′	10′	15′
°	′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
15	00	3.676	7.351	11.027	14.702	22.054
	05	.674	.348	.023	.697	.045
	07½	.673	.347	.020	.694	.041
	10	.673	.346	.018	.691	.037
	15	3.671	7.343	11.014	14.685	22.028
	20	.670	.340	.010	.679	.019
	22½	.669	.338	.007	.677	.015
	25	.668	.337	.005	.674	.010
	30	3.667	7.334	11.001	14.668	22.002
	35	.665	.331	10.996	.662	21.993
	37½	.665	.329	.994	.659	.988
	40	.664	.328	.992	.656	.984
	45	3.662	7.325	10.987	14.650	21.975
	50	.661	.322	.983	.644	.966
	52½	.660	.320	.981	.641	.962
	55	.659	.319	.978	.638	.957
16	00	3.658	7.316	10.974	14.632	21.948
	05	.656	.313	.969	.626	.939
	07½	.656	.311	.967	.623	.934
	10	.655	.310	.965	.620	.930
	15	3.653	7.307	10.960	14.614	21.920
	20	.652	.304	.956	.607	.911
	22½	.651	.302	.953	.604	.907
	25	.650	.301	.951	.601	.902
	30	3.649	7.297	10.946	14.595	21.893
	35	.647	.294	.942	.589	.883
	37½	.646	.293	.939	.586	.878
	40	.646	.291	.937	.582	.874
	45	3.644	7.288	10.932	14.576	21.864
	50	.642	.285	.927	.570	.855
	52½	.642	.283	.925	.567	.850
	55	.641	.282	.922	.563	.845
17	00	3.639	7.278	10.918	14.557	21.835
	05	.638	.275	.913	.551	.826
	07½	.637	.274	.910	.547	.821
	10	.636	.272	.908	.544	.816
	15	3.634	7.269	10.903	14.538	21.806
	20	.633	.265	.898	.531	.796
	22½	.632	.264	.896	.528	.792
	25	.631	.262	.893	.524	.787
	30	3.629	7.259	10.888	14.518	21.777
	35	.628	.256	.883	.511	.767
	37½	.627	.254	.881	.508	.762
	40	.626	.252	.878	.505	.757
	45	3.624	7.249	10.873	14.498	21.747
	50	.623	.246	.868	.491	.737
	52½	.622	.244	.866	.488	.732
	55	.621	.242	.863	.484	.727
18	00	3.619	7.239	10.858	14.478	21.716

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 15°	2½	3.781	0.000
	5	7.562	.001
	7½	11.344	.003
	10	15.125	.006
	12½	18.907	.009
	15	22.688	.012
For latitude 16°	2½	3.782	0.000
	5	7.563	.001
	7½	11.345	.003
	10	15.126	.006
	12½	18.908	.009
	15	22.690	.013
For latitude 17°	2½	3.782	0.000
	5	7.564	.002
	7½	11.346	.003
	10	15.128	.006
	12½	18.910	.010
	15	22.692	.014
For latitude 18°	2½	3.782	0.000
	5	7.565	.002
	7½	11.347	.004
	10	15.129	.006
	12½	18.912	.010
	15	22.694	.015

TABLE 2.—*Coordinates for the projection of maps, scale* $\frac{1}{480000}$—Continued

Latitude of parallel	Abscissas of developed parallel				
	Longitude interval				
	2½′	5′	7½′	10′	15′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
18 00	3.619	7.239	10.858	14.478	21.716
05	.618	.235	.853	.471	.706
07½	.617	.234	.850	.467	.701
10	.616	.232	.848	.464	.696
15	3.614	7.228	10.843	14.457	21.686
20	.613	.225	.838	.450	.675
22½	.612	.223	.835	.447	.670
25	.611	.222	.832	.443	.665
30	3.609	7.218	10.827	14.436	21.654
35	.607	.215	.822	.429	.644
37½	.606	.213	.819	.426	.639
40	.606	.211	.817	.422	.633
45	3.604	7.208	10.811	14.415	21.623
50	.602	.204	.806	.408	.612
52½	.601	.202	.803	.404	.607
55	.600	.200	.801	.401	.601
19 00	3.598	7.197	10.795	14.394	21.591
05	.597	.193	.790	.387	.580
07½	.596	.192	.787	.383	.574
10	.595	.190	.785	.379	.569
15	3.593	7.186	10.779	14.372	21.558
20	.591	.182	.774	.365	.547
22½	.590	.181	.771	.361	.542
25	.589	.179	.768	.358	.536
30	3.588	7.175	10.763	14.350	21.525
35	.586	.171	.757	.343	.514
37½	.585	.170	.754	.339	.509
40	.584	.168	.752	.335	.503
45	3.582	7.164	10.746	14.328	21.492
50	.580	.160	.741	.321	.481
52½	.579	.158	.738	.317	.475
55	.578	.157	.735	.313	.470
20 00	3.576	7.153	10.729	14.306	21.458
05	.575	.149	.724	.298	.447
07½	.574	.147	.721	.294	.441
10	.573	.145	.718	.290	.436
15	3.571	7.141	10.712	14.283	21.424
20	.569	.138	.706	.275	.413
22½	.568	.136	.704	.271	.407
25	.567	.134	.701	.268	.401
30	3.565	7.130	10.695	14.260	21.390
35	.563	.126	.689	.252	.378
37½	.562	.124	.686	.248	.372
40	.561	.122	.683	.244	.367
45	3.559	7.118	10.678	14.237	21.355
50	.557	.114	.672	.229	.343
52½	.556	.112	.669	.225	.337
55	.555	.110	.666	.221	.331
21 00	3.553	7.107	10.660	14.213	21.320

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 18°	2½	3.782	0.000
	5	7.565	.002
	7½	11.347	.004
	10	15.129	.006
	12½	18.912	.010
	15	22.694	.015
For latitude 19°	2½	3.783	0.000
	5	7.566	.002
	7½	11.348	.004
	10	15.131	.007
	12½	18.914	.011
	15	22.697	.015
For latitude 20°	2½	3.783	0.000
	5	7.566	.002
	7½	11.350	.004
	10	15.133	.007
	12½	18.916	.011
	15	22.699	.016
For latitude 21°	2½	3.784	0.000
	5	7.567	.002
	7½	11.351	.004
	10	15.135	.007
	12½	18.919	.012
	15	22.702	.017

TABLE 2.—*Coordinates for the projection of maps, scale* $\frac{1}{48000}$—Continued

Latitude of parallel	Abscissas of developed parallel				
	Longitude interval				
	2½′	5′	7½′	10′	15′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
21 00	3.553	7.107	10.660	14.213	21.320
05	.551	.103	.654	.205	.308
07½	.550	.101	.651	.201	.302
10	.549	.099	.648	.197	.296
15	3.547	7.095	10.642	14.189	21.284
20	.545	.091	.636	.181	.272
22½	.544	.089	.633	.177	.266
25	.543	.087	.630	.173	.260
30	3.541	7.083	10.624	14.165	21.248
35	.539	.079	.618	.157	.236
37½	.538	.077	.615	.153	.230
40	.537	.075	.612	.149	.224
45	3.535	7.070	10.606	14.141	21.211
50	.533	.066	.600	.133	.199
52½	.532	.064	.596	.129	.193
55	.531	.062	.593	.125	.187
22 00	3.529	7.058	10.587	14.116	21.174
05	.527	.054	.581	.108	.162
07½	.526	.052	.578	.104	.156
10	.525	.050	.575	.100	.150
15	3.523	7.046	10.569	14.091	21.137
20	.521	.042	.562	.083	.125
22½	.520	.039	.559	.079	.118
25	.519	.037	.556	.075	.112
30	3.517	7.033	10.550	14.066	21.099
35	.514	.029	.543	.058	.087
37½	.513	.027	.540	.054	.080
40	.512	.025	.537	.049	.074
45	3.510	7.020	10.531	14.041	21.061
50	.508	.016	.524	.032	.049
52½	.507	.014	.521	.028	.042
55	.506	.012	.518	.024	.036
23 00	3.504	7.008	10.511	14.015	21.023
05	.502	.003	.505	.007	.010
07½	.501	.001	.502	.002	.003
10	.499	6.999	.498	13.998	20.997
15	3.497	6.995	10.492	13.989	20.984
20	.495	.990	.485	.981	.971
22½	.494	.988	.482	.976	.964
25	.493	.986	.479	.972	.958
30	3.491	6.982	10.472	13.963	20.945
35	.489	.977	.466	.954	.931
37½	.487	.975	.462	.950	.925
40	.486	.973	.459	.945	.918
45	3.484	6.968	10.452	13.937	20.905
50	.482	.964	.446	.928	.892
52½	.481	.962	.442	.923	.885
55	.480	.959	.439	.919	.878
24 00	3.477	6.955	10.432	13.910	20.865

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 21°	2½	3.784	0.000
	5	7.567	.002
	7½	11.351	.004
	10	15.135	.007
	12½	18.919	.012
	15	22.702	.017
For latitude 22°	2½	3.784	0.000
	5	7.568	.002
	7½	11.352	.004
	10	15.136	.008
	12½	18.921	.012
	15	22.705	.017
For latitude 23°	2½	3.785	0.000
	5	7.569	.002
	7½	11.354	.004
	10	15.138	.008
	12½	18.923	.012
	15	22.708	.018
For latitude 24°	2½	3.785	0.001
	5	7.570	.002
	7½	11.355	.005
	10	15.140	.008
	12½	18.926	.013
	15	22.711	.019

TABLE 2.—*Coordinates for the projection of maps, scale* $\frac{1}{48000}$—Continued

Latitude of parallel	Abscissas of developed parallel: Longitude interval 2½′	5′	7½′	10′	15′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
24 00	3.477	6.955	10.432	13.910	20.865
05	.475	.950	.426	.900	.851
07½	.474	.948	.422	.896	.845
10	.473	.946	.419	.892	.838
15	3.471	6.941	10.412	13.883	20.824
20	.468	.937	.405	.874	.811
22½	.467	.935	.402	.869	.804
25	.466	.932	.398	.865	.797
30	3.464	6.928	10.392	13.856	20.783
35	.462	.923	.385	.846	.770
37½	.460	.921	.381	.842	.763
40	.459	.919	.378	.837	.756
45	3.457	6.914	10.371	13.828	20.742
50	.455	.909	.364	.819	.728
52½	.454	.907	.361	.814	.721
55	.452	.905	.357	.810	.714
25 00	3.450	6.900	10.350	13.800	20.700
05	.448	.895	.343	.791	.686
07½	.447	.893	.340	.786	.679
10	.445	.891	.336	.782	.672
15	3.443	6.886	10.329	13.772	20.658
20	.441	.881	.322	.763	.644
22½	.440	.879	.318	.758	.637
25	.438	.877	.315	.753	.630
30	3.436	6.872	10.308	13.744	20.616
35	.434	.867	.301	.734	.602
37½	.432	.865	.297	.730	.594
40	.431	.862	.294	.725	.587
45	3.429	6.858	10.286	13.715	20.573
50	.426	.853	.279	.706	.559
52½	.425	.850	.276	.701	.551
55	.424	.848	.272	.696	.544
26 00	3.422	6.843	10.265	13.686	20.530
05	.419	.838	.258	.677	.515
07½	.418	.836	.254	.672	.508
10	.417	.834	.250	.667	.501
15	3.414	6.829	10.243	13.657	20.486
20	.412	.824	.236	.648	.471
22½	.411	.821	.232	.643	.464
25	.409	.819	.228	.638	.457
30	3.407	6.814	10.221	13.628	20.442
35	.405	.809	.214	.618	.427
37½	.403	.807	.210	.613	.420
40	.402	.804	.206	.608	.412
45	3.400	6.799	10.199	13.598	20.398
50	.397	.794	.191	.588	.383
52½	.396	.792	.188	.584	.375
55	.395	.789	.184	.579	.368
27 00	3.392	6.784	10.176	13.569	20.353

Ordinates of developed parallel and meridional distances: Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 24°	2½	3.785	0.001
	5	7.570	.002
	7½	11.355	.005
	10	15.140	.008
	12½	18.926	.013
	15	22.711	.019
For latitude 25°	2½	3.786	0.001
	5	7.571	.002
	7½	11.357	.005
	10	15.142	.008
	12½	18.928	.013
	15	22.714	.019
For latitude 26°	2½	3.786	0.001
	5	7.572	.002
	7½	11.358	.005
	10	15.144	.009
	12½	18.931	.014
	15	22.717	.020
For latitude 27°	2½	3.787	0.001
	5	7.573	.002
	7½	11.360	.005
	10	15.147	.009
	12½	18.934	.014
	15	22.720	.020

TABLE 2.—*Coordinates for the projection of maps, scale* $\frac{1}{48000}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 2½′	5′	7½′	10′	15′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
27 00	3.392	6.784	10.176	13.569	20.353
05	.390	.779	.169	.559	.338
07½	.388	.777	.165	.553	.330
10	.387	.774	.161	.548	.323
15	3.385	6.769	10.154	13.538	20.308
20	.382	.764	.146	.528	.292
22½	.381	.762	.142	.523	.285
25	.380	.759	.139	.518	.277
30	3.377	6.754	10.131	13.508	20.262
35	.374	.749	.123	.498	.247
37½	.373	.746	.120	.493	.239
40	.372	.744	.116	.488	.231
45	3.369	6.739	10.108	13.477	20.216
50	.367	.734	.100	.467	.201
52½	.365	.731	.096	.462	.193
55	.364	.728	.093	.457	.185
28 00	3.362	6.723	10.085	13.446	20.170
05	.359	.718	.077	.436	.154
07½	.358	.715	.073	.431	.146
10	.356	.713	.069	.426	.139
15	3.354	6.708	10.061	13.415	20.123
20	.351	.702	.054	.405	.107
22½	.350	.700	.050	.400	.099
25	.349	.697	.046	.394	.092
30	3.346	6.692	10.038	13.384	20.076
35	.343	.687	.030	.373	.060
37½	.342	.684	.026	.368	.052
40	.341	.681	.022	.363	.044
45	3.338	6.676	10.014	13.352	20.028
50	.335	.671	.006	.342	.012
52½	.334	.668	.002	.336	.004
55	.333	.666	9.998	.331	19.996
29 00	3.330	6.660	9.990	13.320	19.980
05	.327	.655	.982	.310	.964
07½	.326	.652	.978	.304	.956
10	.325	.649	.974	.299	.948
15	3.322	6.644	9.966	13.288	19.932
20	.319	.639	.958	.277	.916
22½	.318	.636	.954	.272	.908
25	.317	.633	.950	.267	.900
30	3.314	6.628	9.942	13.256	19.884
35	.311	.622	.934	.245	.867
37½	.310	.620	.929	.239	.859
40	.308	.617	.925	.234	.851
45	3.306	6.611	9.917	13.223	19.835
50	.303	.606	.909	.212	.818
52½	.302	.603	.905	.207	.810
55	.300	.601	.901	.201	.802
30 00	3.298	6.595	9.893	13.190	19.785

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 27°	2½	3.787	0.001
	5	7.573	.002
	7½	11.360	.005
	10	15.147	.009
	12½	18.934	.014
	15	22.720	.020
For latitude 28°	2½	3.787	0.001
	5	7.574	.002
	7½	11.362	.005
	10	15.149	.009
	12½	18.936	.014
	15	22.723	.021
For latitude 29°	2½	3.788	0.001
	5	7.575	.002
	7½	11.363	.005
	10	15.151	.009
	12½	18.939	.015
	15	22.727	.021
For latitude 30°	2½	3.788	0.001
	5	7.577	.002
	7½	11.365	.005
	10	15.153	.010
	12½	18.942	.015
	15	22.730	.022

TABLE 2.—*Coordinates for the projection of maps, scale* $\frac{1}{48000}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 2½′	5′	7½′	10′	15′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
30 00	3.298	6.595	9.893	13.190	19.785
05	.295	.589	.884	.179	.769
07½	.293	.587	.880	.174	.760
10	.292	.584	.876	.168	.752
15	3.289	6.578	9.868	13.157	19.735
20	.286	.573	.859	.146	.719
22½	.285	.570	.855	.140	.710
25	.284	.567	.851	.135	.702
30	3.281	6.562	9.843	13.123	19.685
35	.278	.556	.834	.112	.668
37½	.277	.553	.830	.107	.660
40	.275	.551	.826	.101	.652
45	3.272	6.545	9.817	13.090	19.635
50	.270	.539	.809	.078	.618
52½	.268	.536	.805	.073	.609
55	.267	.534	.800	.067	.601
31 00	3.264	6.528	9.792	13.056	19.584
05	.261	.522	.783	.044	.567
07½	.260	.519	.779	.039	.558
10	.258	.517	.775	.033	.550
15	3.255	6.511	9.766	13.022	19.532
20	.253	.505	.758	.010	.515
22½	.251	.502	.753	.004	.507
25	.250	.499	.749	12.999	.498
30	3.247	6.494	9.740	12.987	19.481
35	.244	.488	.732	.976	.464
37½	.242	.485	.727	.970	.455
40	.241	.482	.723	.964	.446
45	3.238	6.476	9.714	12.953	19.429
50	.235	.470	.706	.941	.411
52½	.234	.468	.701	.935	.403
55	.232	.465	.697	.929	.394
32 00	3.229	6.459	9.688	12.918	19.376
05	.226	.453	.679	.906	.359
07½	.225	.450	.675	.900	.350
10	.224	.447	.671	.894	.341
15	3.221	6.441	9.662	12.882	19.324
20	.218	.435	.653	.871	.307
22½	.216	.432	.649	.865	.297
25	.215	.429	.644	.859	.288
30	3.212	6.424	9.635	12.847	19.271
35	.209	.418	.626	.835	.253
37½	.207	.415	.622	.829	.244
40	.206	.412	.617	.823	.235
45	3.203	6.406	9.608	12.811	19.217
50	.200	.400	.600	.799	.199
52½	.198	.397	.595	.793	.190
55	.197	.394	.591	.787	.181
33 00	3.194	6.388	9.582	12.775	19.163

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 30°	2½	3.788	0.001
	5	7.577	.002
	7½	11.365	.005
	10	15.153	.010
	12½	18.942	.015
	15	22.730	.022
For latitude 31°	2½	3.789	0.001
	5	7.578	.002
	7½	11.367	.005
	10	15.156	.010
	12½	18.945	.015
	15	22.734	.022
For latitude 32°	2½	3.789	0.001
	5	7.579	.002
	7½	11.369	.006
	10	15.158	.010
	12½	18.948	.016
	15	22.737	.022
For latitude 33°	2½	3.790	0.001
	5	7.580	.003
	7½	11.370	.006
	10	15.161	.010
	12½	18.951	.016
	15	22.741	.023

TABLE 2.—*Coordinates for the projection of maps, scale $\frac{1}{48000}$*—Continued

Latitude of parallel		Abscissas of developed parallel				
		Longitude interval				
		2½′	5′	7½′	10′	15′
°	′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
33	00	3. 194	6. 388	9. 582	12. 775	19. 163
	05	. 191	. 382	. 573	. 763	. 145
	07½	. 189	. 379	. 568	. 757	. 136
	10	. 188	. 376	. 564	. 751	. 127
	15	3. 185	6. 370	9. 554	12. 739	19. 109
	20	. 182	. 364	. 545	. 727	. 091
	22½	. 180	. 361	. 541	. 721	. 082
	25	. 179	. 358	. 536	. 715	. 073
	30	3. 176	6. 351	9. 527	12. 703	19. 054
	35	. 173	. 345	. 518	. 691	. 036
	37½	. 171	. 342	. 513	. 685	. 027
	40	. 170	. 339	. 509	. 679	. 018
	45	3. 167	6. 333	9. 500	12. 666	18. 999
	50	. 164	. 327	. 491	. 654	. 981
	52½	. 162	. 324	. 486	. 648	. 972
	55	. 160	. 321	. 481	. 642	. 963
34	00	3. 157	6. 315	9. 472	12. 629	18. 944
	05	. 154	. 309	. 463	. 617	. 926
	07½	. 153	. 305	. 458	. 611	. 916
	10	. 151	. 302	. 453	. 605	. 907
	15	3. 148	6. 296	9. 444	12. 592	18. 888
	20	. 145	. 290	. 435	. 580	. 870
	22½	. 143	. 287	. 430	. 574	. 860
	25	. 142	. 284	. 426	. 567	. 851
	30	3. 139	6. 277	9. 416	12. 555	18. 832
	35	. 136	. 271	. 407	. 542	. 814
	37½	. 134	. 268	. 402	. 536	. 804
	40	. 132	. 265	. 397	. 530	. 795
	45	3. 129	6. 259	9. 388	12. 517	18. 776
	50	. 126	. 252	. 379	. 505	. 757
	52½	. 125	. 249	. 374	. 498	. 748
	55	. 123	. 246	. 369	. 492	. 738
35	00	3. 120	6. 240	9. 360	12. 480	18. 719
	05	. 117	. 233	. 350	. 467	. 700
	07½	. 115	. 230	. 345	. 460	. 691
	10	. 114	. 227	. 341	. 454	. 681
	15	3. 110	6. 221	9. 331	12. 441	18. 662
	20	. 107	. 214	. 321	. 429	. 643
	22½	. 106	. 211	. 317	. 422	. 633
	25	. 104	. 208	. 312	. 416	. 624
	30	3. 101	6. 202	9. 302	12. 403	18. 605
	35	. 098	. 195	. 293	. 390	. 585
	37½	. 096	. 192	. 288	. 384	. 576
	40	. 094	. 189	. 283	. 377	. 566
	45	3. 091	6. 182	9. 273	12. 365	18. 547
	50	. 088	. 176	. 264	. 352	. 528
	52½	. 086	. 173	. 259	. 345	. 518
	55	. 085	. 169	. 254	. 339	. 508
36	00	3. 081	6. 163	9. 244	12. 326	18. 489

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 33°	2½	3. 790	0. 001
	5	7. 580	. 003
	7½	11. 370	. 006
	10	15. 161	. 010
	12½	18. 951	. 016
	15	22. 741	. 023
For latitude 34°	2½	3. 791	0. 001
	5	7. 581	. 003
	7½	11. 372	. 006
	10	15. 163	. 010
	12½	18. 954	. 016
	15	22. 745	. 023
For latitude 35°	2½	3. 791	0. 001
	5	7. 583	. 003
	7½	11. 374	. 006
	10	15. 166	. 010
	12½	18. 957	. 016
	15	22. 748	. 023
For latitude 36°	2½	3. 792	0. 001
	5	7. 584	. 003
	7½	11. 376	. 006
	10	15. 168	. 010
	12½	18. 961	. 016
	15	22. 752	. 024

TABLE 2.—*Coordinates for the projection of maps, scale $\frac{1}{48000}$*—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 2½′	5′	7½′	10′	15′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
36 00	3.081	6.163	9.244	12.326	18.489
05	.078	.156	.235	.313	.469
07½	.077	.153	.230	.306	.459
10	.075	.150	.225	.300	.450
15	3.072	6.143	9.215	12.287	18.430
20	.068	.137	.205	.274	.411
22½	.067	.134	.200	.267	.401
25	.065	.130	.195	.261	.391
30	3.062	6.124	9.186	12.248	.371
35	.059	.117	.176	.234	.352
37½	.057	.114	.171	.228	.342
40	055	.111	.166	.221	.332
45	3.052	6.104	9.156	12.208	18.312
50	.049	.097	.146	.195	.292
52½	.047	.094	.141	.188	.282
55	.045	.091	.136	.182	.272
37 00	3.042	6.084	9.126	12.168	18.252
05	.039	.077	.116	.155	.233
07½	.037	.074	.111	.148	.223
10	.035	.071	.106	.142	.213
15	3.032	6.064	9.096	12, 128	18.193
20	.029	.057	.086	.115	.172
22½	.027	.054	.081	.108	.162
25	.025	.051	.076	.102	.152
30	3.022	6.044	9.066	12.088	18.132
35	.019	.037	.056	.075	.112
37½	.017	.034	.051	.068	.102
40	.015	.031	.046	.061	.092
45	3.012	6.024	9.036	12.048	18.072
50	.009	.017	.026	.034	.051
52½	.007	.014	.021	.027	.041
55	.005	.010	.015	.021	.031
38 00	3.002	6.004	9.005	12.007	18.011
05	2.998	5.997	8.995	11.994	17.990
07½	.997	.993	.990	.987	.980
10	.995	.990	.985	.980	.970
15	2.992	5.983	8.975	11.966	17.949
20	.988	.976	.964	.953	.929
22½	.986	.973	.959	.946	.919
25	.985	.969	.954	.939	.908
30	2.982	5.963	8.944	11.925	17.888
35	.978	.956	.934	.911	.867
37½	.976	.952	.928	.905	.857
40	.974	.949	.923	.898	.846
45	2.971	5.942	8.913	11.884	17.826
50	.968	.935	.903	.870	.805
52½	.966	.932	.897	.863	.795
55	.964	.928	.892	.856	.784
39 00	2.961	5.921	8.882	11.842	17.763

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 36°	2½	3.792	0.001
	5	7.584	.003
	7½	11.376	.006
	10	15.168	.010
	12½	18.961	.016
	15	22.752	.024
For latitude 37°	2½	3.793	0.001
	5	7.585	.003
	7½	11.378	.006
	10	15.171	.011
	12½	18.964	.017
	15	22.756	.024
For latitude 38°	2½	3.793	0.001
	5	7.587	.003
	7½	11.380	.006
	10	15.173	.011
	12½	18.967	.017
	15	22.760	.024
For latitude 39°	2½	3.794	0.001
	5	7.588	.003
	7½	11.382	.006
	10	15.176	.011
	12½	18.970	.017
	15	22.764	.024

TABLE 2.—*Coordinates for the projection of maps, scale $\frac{1}{48000}$*—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 2½′	5′	7½′	10′	15′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
39 00	2.961	5.921	8.882	11.842	17.763
05	.957	.914	.871	.828	.743
07½	.955	.911	.866	.821	.732
10	.954	.907	.861	.814	.722
15	2.950	5.900	8.850	11.800	17.701
20	.947	.893	.840	.786	.680
22½	.945	.890	.835	.779	.669
25	.943	.886	.829	.772	.659
30	2.940	5.879	8.819	11.758	17.638
35	.936	.872	.808	.744	.617
37½	.934	.869	.803	.737	.606
40	.933	.865	.798	.730	.595
45	2.929	5.858	8.787	11.716	17.574
50	.926	.851	.777	.702	.553
52½	.924	.848	.771	.695	.543
55	.922	.844	.766	.688	.532
40 00	2.918	5.837	8.755	11.674	17.511
05	.915	.830	.745	.660	.489
07½	.913	.826	.739	.652	.479
10	.911	.823	.734	.645	.468
15	2.908	5.816	8.723	11.631	17.447
20	.904	.808	.713	.617	.425
22½	.902	.805	.707	.610	.414
25	.901	.801	.702	.603	.404
30	2.897	5.794	8.691	11.588	17.382
35	.893	.787	.680	.574	.361
37½	.892	.783	.675	.567	.350
40	.890	.780	.670	.559	.339
45	2.886	5.773	8.659	11.545	17.318
50	.883	.765	.648	.531	.296
52½	.881	.762	.643	.523	.285
55	.879	.758	.637	.516	.274
41 00	2.875	5.751	8.626	11.502	17.253
05	.872	.744	.615	.487	.231
07½	.870	.740	.610	.480	.220
10	.868	.736	.605	.473	.209
15	2.864	5.729	8.594	11.458	17.187
20	.861	.722	.583	.444	.165
22½	.859	.718	.577	.436	.154
25	.857	.714	.572	.429	.143
30	2.854	5.707	8.561	11.414	17.122
35	.850	.700	.550	.400	.100
37½	.848	.696	.544	.392	.089
40	.846	.692	.539	.385	.078
45	2.843	5.685	8.528	11.370	17.056
50	.839	.678	.517	.356	.033
52½	.837	.674	.511	.348	.022
55	.835	.670	.506	.341	.011
42 00	2.832	5.663	8.495	11.326	16.989

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 39°	2½	3.794	0.001
	5	7.588	.003
	7½	11.382	.006
	10	15.176	.011
	12½	18.970	.017
	15	22.764	.024
For latitude 40°	2½	3.795	0.001
	5	7.589	.003
	7½	11.384	.006
	10	15.179	.011
	12½	18.974	.017
	15	22.768	.025
For latitude 41°	2½	3.795	0.001
	5	7.591	.003
	7½	11.386	.006
	10	15.181	.011
	12½	18.977	.017
	15	22.772	.025
For latitude 42°	2½	3.796	0.001
	5	7.592	.003
	7½	11.388	.006
	10	15.184	.011
	12½	18.980	.017
	15	22.776	.025

TABLE 2.—*Coordinates for the projection of maps, scale* $\frac{1}{48000}$—Continued

Latitude of parallel	Abscissas of developed parallel				
	Longitude interval				
	2½′	5′	7½′	10′	15′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
42 00	2. 832	5. 663	8. 495	11. 326	16. 989
05	. 828	. 656	. 483	. 311	. 967
07½	. 826	. 652	. 478	. 304	. 956
10	. 824	. 648	. 472	. 297	. 945
15	2. 820	5. 641	8. 461	11. 282	16. 923
20	. 817	. 633	. 450	. 267	. 900
22½	. 815	. 630	. 445	. 259	. 889
25	. 813	. 626	. 439	. 252	. 878
30	2. 809	5. 619	8. 428	11. 237	16. 856
35	. 806	. 611	. 417	. 222	. 833
37½	. 804	. 607	. 411	. 215	. 822
40	. 802	. 604	. 405	. 207	. 811
45	2. 798	5. 596	8. 394	11. 192	16. 788
50	. 794	. 589	. 383	. 177	. 766
52½	. 792	. 585	. 377	. 170	. 754
55	. 791	. 581	. 372	. 162	. 743
43 00	2. 787	5. 574	8. 360	11. 147	16. 721
05	. 783	. 566	. 349	. 132	. 698
07½	. 781	. 562	. 343	. 124	. 687
10	. 779	. 558	. 338	. 117	. 675
15	2. 775	5. 551	8. 326	11. 102	16. 653
20	. 772	. 543	. 315	. 087	. 630
22½	. 770	. 540	. 309	. 079	. 619
25	. 768	. 536	. 304	. 071	. 607
30	2. 764	5. 528	8. 292	11. 056	16. 584
35	. 760	. 520	. 281	. 041	. 562
37½	. 758	. 517	. 275	. 033	. 550
40	. 756	. 513	. 269	. 026	. 539
45	2. 753	5. 505	8. 258	11. 011	16. 516
50	. 749	. 498	. 246	10. 995	. 493
52½	. 747	. 494	. 241	. 988	. 481
55	. 745	. 490	. 235	. 980	. 470
44 00	2. 741	5. 482	8. 223	10. 965	16. 447
05	. 737	. 475	. 212	. 949	. 424
07½	. 735	. 471	. 206	. 942	. 412
10	. 733	. 467	. 200	. 934	. 401
15	2. 730	5. 459	8. 189	10. 918	16. 378
20	. 726	. 452	. 177	. 903	. 355
22½	. 724	. 448	. 171	. 895	. 343
25	. 722	. 444	. 166	. 888	. 331
30	2. 718	5. 436	8. 154	10. 872	16. 308
35	. 714	. 428	. 142	. 857	. 285
37½	. 712	. 424	. 137	. 849	. 273
40	. 710	. 421	. 131	. 841	. 262
45	2. 706	5. 413	8. 119	10. 826	16. 238
50	. 703	. 405	. 108	. 810	. 215
52½	. 701	. 401	. 102	. 802	. 203
55	. 699	. 397	. 096	. 794	. 192
45 00	2. 695	5. 389	8. 084	10. 779	16. 168

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 42°	2½	3. 796	0. 001
	5	7. 592	. 003
	7½	11. 388	. 006
	10	15. 184	. 011
	12½	18. 980	. 017
	15	22. 776	. 025
For latitude 43°	2½	3. 797	0. 001
	5	7. 593	. 003
	7½	11. 390	. 006
	10	15. 187	. 011
	12½	18. 984	. 017
	15	22. 780	. 025
For latitude 44°	2½	3. 797	0. 001
	5	7. 595	. 003
	7½	11. 392	. 006
	10	15. 189	. 011
	12½	18. 987	. 017
	15	22. 784	. 025
For latitude 45°	2½	3. 798	0. 001
	5	7. 596	. 003
	7½	11. 394	. 006
	10	15. 192	. 011
	12½	18. 990	. 017
	15	22. 788	. 025

TABLE 2.—*Coordinates for the projection of maps, scale* $\frac{1}{48000}$—Continued

Latitude of parallel	Abscissas of developed parallel				
	Longitude interval				
	2½′	5′	7½′	10′	15′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
45 00	2. 695	5. 389	8. 084	10. 779	16. 168
05	. 691	. 382	. 072	. 763	. 145
07½	. 689	. 378	. 066	. 755	. 133
10	. 687	. 374	. 061	. 747	. 121
15	2. 683	5. 366	8. 049	10. 732	16. 098
20	. 679	. 358	. 037	. 716	. 074
22½	. 677	. 354	. 031	. 708	. 062
25	. 675	. 350	. 025	. 700	. 051
30	2. 671	5. 342	8. 014	10. 685	16. 027
35	. 667	. 334	. 002	. 669	. 003
37½	. 665	. 330	7. 996	. 661	15. 991
40	. 663	. 327	. 990	. 653	. 980
45	2. 659	5. 319	7. 978	10. 637	15. 956
50	. 655	. 311	. 966	. 621	. 932
52½	. 653	. 307	. 960	. 613	. 920
55	. 651	. 303	. 954	. 606	. 908
46 00	2. 647	5. 295	7. 942	10. 590	15. 884
05	. 643	. 287	. 930	. 574	. 861
07½	. 641	. 283	. 924	. 566	. 849
10	. 639	. 279	. 918	. 558	. 837
15	2. 635	5. 271	7. 906	10. 542	15. 813
20	. 631	. 263	. 894	. 526	. 789
22½	. 629	. 259	. 888	. 518	. 777
25	. 627	. 255	. 882	. 510	. 765
30	2. 623	5. 247	7. 870	10. 494	15. 741
35	. 619	. 239	. 858	. 478	. 717
37½	. 617	. 235	. 852	. 470	. 705
40	. 615	. 231	. 846	. 462	. 693
45	2. 611	5. 223	7. 834	10. 446	15. 669
50	. 607	. 215	. 822	. 430	. 644
52½	. 605	. 211	. 816	. 422	. 632
55	. 603	. 207	. 810	. 413	. 620
47 00	2. 599	5. 199	7. 798	10. 397	15. 596
05	. 595	. 191	. 786	. 381	. 572
07½	. 593	. 187	. 780	. 373	. 560
10	. 591	. 182	. 774	. 365	. 547
15	2. 587	5. 174	7. 762	10. 349	15. 523
20	. 583	. 166	. 749	. 332	. 499
22½	. 581	. 162	. 743	. 324	. 486
25	. 579	. 158	. 737	. 316	. 474
30	2. 575	5. 150	7. 725	10. 300	15. 450
35	. 571	. 142	. 713	. 284	. 425
37½	. 569	. 138	. 707	. 275	. 413
40	. 567	. 134	. 700	. 267	. 401
45	2. 563	5. 125	7. 688	10. 251	15. 376
50	. 559	. 117	. 676	. 235	. 352
52½	. 557	. 113	. 670	. 226	. 339
55	. 555	. 109	. 664	. 218	. 327
48 00	2. 550	5. 101	7. 651	10. 202	15. 303

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 45°	2½	3. 798	0. 001
	5	7. 596	. 003
	7½	11. 394	. 006
	10	15. 192	. 011
	12½	18. 990	. 017
	15	22. 788	. 025
For latitude 46°	2½	3. 799	0. 001
	5	7. 597	. 003
	7½	11. 396	. 006
	10	15. 195	. 011
	12½	18. 994	. 017
	15	22. 792	. 025
For latitude 47°	2½	3. 799	0. 001
	5	7. 599	. 003
	7½	11. 398	. 006
	10	15. 197	. 011
	12½	18. 997	. 017
	15	22. 796	. 025
For latitude 48°	2½	3. 800	0. 001
	5	7. 600	. 003
	7½	11. 400	. 006
	10	15. 200	. 011
	12½	19. 000	. 017
	15	22. 800	. 025

TABLE 2.—*Coordinates for the projection of maps, scale* $\frac{1}{48000}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval				
	2½′	5′	7½′	10′	15′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
48 00	2.550	5.101	7.651	10.202	15.303
05	.546	.093	.639	.185	.278
07½	.544	.088	.633	.177	.266
10	.542	.084	.627	.169	.253
15	2.538	5.076	7.614	10.152	15.228
20	.534	.068	.602	.136	.204
22½	.532	.064	.596	.128	.191
25	.530	.060	.589	.119	.179
30	2.526	5.051	7.577	10.103	15.154
35	.522	.043	.565	.086	.129
37½	.519	.039	.558	.078	.117
40	.517	.035	.552	.070	.104
45	2.513	5.026	7.540	10.053	15.079
50	.509	.018	.527	.036	.055
52½	.507	.014	.521	.028	.042
55	.505	.010	.515	.020	.030
49 00	2.501	5.001	7.502	10.003	15.005
05	.497	4.993	.490	9.986	14.979
07½	.494	.989	.483	.978	.967
10	.492	.985	.477	.970	.954
15	2.488	4.976	7.465	9.953	14.929
20	.484	.968	.452	.936	.904
22½	.482	.964	.446	.928	.892
25	.480	.960	.439	.919	.879
30	2.476	4.951	7.427	9.902	14.854
35	.471	.943	.414	.886	.829
37½	.469	.939	.408	.877	.816
40	.467	.934	.402	.869	.803
45	2.463	4.926	7.389	9.852	14.778
50	.459	.918	.376	.835	.753
52½	.457	.913	.370	.827	.740
55	.455	.909	.364	.818	.727
50 00	2.450	4.901	7.351	9.801	14.702
05	.446	.892	.338	.784	.676
07½	.444	.888	.332	.776	.664
10	.442	.884	.326	.767	.651
15	2.438	4.875	7.313	9.750	14.625
20	.433	.867	.300	.733	.600
22½	.431	.862	.294	.725	.587
25	.429	.858	.287	.716	.574
30	2.425	4.850	7.274	9.699	14.549
35	.421	.841	.262	.682	.523
37½	.418	.837	.255	.674	.510
40	.416	.833	.249	.665	.498
45	2.412	4.824	7.236	9.648	14.472
50	.408	.815	.223	.631	.446
52½	.406	.811	.217	.622	.433
55	.403	.807	.210	.614	.420
51 00	2.399	4.798	7.197	9.596	14.395

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 48°	2½	3.800	0.001
	5	7.600	.003
	7½	11.400	.006
	10	15.200	.011
	12½	19.000	.017
	15	22.800	.025
For latitude 49°	2½	3.801	0.001
	5	7.601	.003
	7½	11.402	.006
	10	15.203	.011
	12½	19.004	.017
	15	22.804	.025
For latitude 50°	2½	3.801	0.001
	5	7.603	.003
	7½	11.404	.006
	10	15.205	.011
	12½	19.007	.017
	15	22.808	.025
For latitude 51°	2½	3.802	0.001
	5	7.604	.003
	7½	11.406	.006
	10	15.208	.011
	12½	19.011	.017
	15	22.812	.024

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$

Latitude of parallel	Abscissas of developed parallel					
	Longitude interval					
	1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
0 00	2.306	2.882	5.764	8.646	11.529	17.293
02½	.306	.882	.764	.646	.529	.293
03¾	.306	.882	.764	.646	.529	.293
05	.306	.882	.764	.646	.529	.293
07½	.306	.882	.764	.646	.529	.293
10	2.306	2.882	5.764	8.646	11.529	17.293
11¼	.306	.882	.764	.646	.528	.293
12½	.306	.882	.764	.646	.528	.293
15	.306	.882	.764	.646	.528	.293
17½	.306	.882	.764	.646	.528	.293
18¾	.306	.882	.764	.646	.528	.293
20	2.306	2.882	5.764	8.646	11.528	17.293
22½	.306	.882	.764	.646	.528	.293
25	.306	.882	.764	.646	.528	.292
26¼	.306	.882	.764	.646	.528	.292
27½	.306	.882	.764	.646	.528	.292
30	2.306	2.882	5.764	8.646	11.528	17.292
32½	.306	.882	.764	.646	.528	.292
33¾	.306	.882	.764	.646	.528	.292
35	.306	.882	.764	.646	.528	.292
37½	.306	.882	.764	.646	.528	.292
40	2.306	2.882	5.764	8.646	11.528	17.292
41¼	.306	.882	.764	.646	.528	.292
42½	.306	.882	.764	.646	.528	.291
45	.306	.882	.764	.646	.528	.291
47½	.305	.882	.764	.646	.527	.291
48¾	.305	.882	.764	.646	.527	.291
50	2.305	2.882	5.764	8.645	11.527	17.291
52½	.305	.882	.764	.645	.527	.291
55	.305	.882	.764	.645	.527	.291
56¼	.305	.882	.763	.645	.527	.290
57½	.305	.882	.763	.645	.527	.290
1 00	2.305	2.882	5.763	8.645	11.527	17.290
02½	.305	.882	.763	.645	.527	.290
03¾	.305	.882	.763	.645	.527	.290
05	.305	.882	.763	.645	.527	.290
07½	.305	.882	.763	.645	.526	.290
10	2.305	2.882	5.763	8.645	11.526	17.289
11¼	.305	.882	.763	.645	.526	.289
12½	.305	.881	.763	.644	.526	.289
15	.305	.881	.763	.644	.526	.289
17½	.305	.881	.763	.644	.526	.288
18¾	.305	.881	.763	.644	.526	.288
20	2.305	2.881	5.763	8.644	11.525	17.288
22½	.305	.881	.763	.644	.525	.288
25	.305	.881	.763	.644	.525	.288
26¼	.305	.881	.762	.644	.525	.287
27½	.305	.881	.762	.644	.525	.287
30	2.305	2.881	5.762	8.643	11.525	17.287
32½	.305	.881	.762	.643	.524	.287
33¾	.305	.881	.762	.643	.524	.286
35	.305	.881	.762	.643	.524	.286
37½	.305	.881	.762	.643	.524	.286
40	2.305	2.881	5.762	8.643	11.524	17.286
41¼	.305	.881	.762	.643	.524	.285
42½	.305	.881	.762	.643	.523	.285
45	.305	.881	.762	.642	.523	.285
47½	.305	.881	.761	.642	.523	.284
48¾	.305	.881	.761	.642	.523	.284
50	2.305	2.881	5.761	8.642	11.523	17.284
52½	.304	.881	.761	.642	.522	.284
55	.304	.881	.761	.642	.522	.283
56¼	.304	.881	.761	.642	.522	.283
57½	.304	.880	.761	.641	.522	.283
2 00	2.304	2.880	5.761	8.641	11.522	17.282

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 0°	1¼	2.863	0.000
	2½	5.725	.000
	3¾	8.588	.000
	5	11.450	.000
	6¼	14.313	.000
	7½	17.176	.000
	10	22.901	.000
	12½	28.626	.000
	15	34.352	.000
For latitude 1°	1¼	2.863	0.000
	2½	5.725	.000
	3¾	8.588	.000
	5	11.451	.000
	6¼	14.313	.000
	7½	17.176	.000
	10	22.901	.001
	12½	28.626	.001
	15	34.352	.001
For latitude 2°	1¼	2.863	0.000
	2½	5.725	.000
	3¾	8.588	.000
	5	11.451	.000
	6¼	14.313	.000
	7½	17.176	.001
	10	22.901	.001
	12½	28.627	.002
	15	34.352	.003

TABLE 3.—*Coordinates for the projection of maps, scale $\frac{1}{31680}$*—Continued

Latitude of parallel	Abscissas of developed parallel					
	Longitude interval					
	1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
2 00	2.304	2.880	5.761	8.641	11.522	17.282
02½	.304	.880	.761	.641	.521	.282
03¾	.304	.880	.761	.641	.521	.282
05	.304	.880	.760	.641	.521	.281
07½	.304	.880	.760	.640	.521	.281
10	2.304	2.880	5.760	8.640	11.520	17.281
11¼	.304	.880	.760	.640	.520	.280
12½	.304	.880	.760	.640	.520	.280
15	.304	.880	.760	.640	.520	.280
17½	.304	.880	.760	.640	.519	.279
18¾	.304	.880	.760	.639	.519	.279
20	2.304	2.880	5.760	8.639	11.519	17.279
22½	.304	.880	.759	.639	.519	.278
25	.304	.880	.759	.639	.518	.278
26¼	.304	.880	.759	.639	.518	.277
27½	.304	.880	.759	.639	.518	.277
30	2.304	2.879	5.759	8.638	11.518	17.276
32½	.303	.879	.759	.638	.517	.276
33¾	.303	.879	.759	.638	.517	.276
35	.303	.879	.758	.638	.517	.275
37½	.303	.879	.758	.637	.516	.275
40	2.303	2.879	5.758	8.637	11.516	17.274
41¼	.303	.879	.758	.637	.516	.274
42½	.303	.879	.758	.637	.516	.274
45	.303	.879	.758	.637	.515	.273
47½	.303	.879	.757	.636	.515	.272
48¾	.303	.879	.757	.636	.515	.272
50	2.303	2.879	5.757	8.636	11.515	17.272
52½	.303	.879	.757	.636	.514	.271
55	.303	.878	.757	.635	.514	.271
56¼	.303	.878	.757	.635	.513	.270
57½	.303	.878	.757	.635	.513	.270
3 00	2.303	2.878	5.756	8.635	11.513	17.269
02½	.302	.878	.756	.634	.512	.269
03¾	.302	.878	.756	.634	.512	.268
05	.302	.878	.756	.634	.512	.268
07½	.302	.878	.756	.634	.512	.267
10	2.302	2.878	5.756	8.633	11.511	17.267
11¼	.302	.878	.755	.633	.511	.266
12½	.302	.878	.755	.633	.511	.266
15	.302	.878	.755	.633	.510	.265
17½	.302	.877	.755	.632	.510	.264
18¾	.302	.877	.755	.632	.509	.264
20	2.302	2.877	5.755	8.632	11.509	17.264
22½	.302	.877	.754	.632	.509	.263
25	.302	.877	.754	.631	.508	.262
26¼	.302	.877	.754	.631	.508	.262
27½	.302	.877	.754	.631	.508	.262
30	2.301	2.877	5.754	8.630	11.507	17.261
32½	.301	.877	.753	.630	.507	.260
33¾	.301	.877	.753	.630	.506	.260
35	.301	.877	.753	.630	.506	.259
37½	.301	.876	.753	.629	.506	.258
40	2.301	2.876	5.753	8.629	11.505	17.258
41¼	.301	.876	.752	.629	.505	.257
42½	.301	.876	.752	.628	.505	.257
45	.301	.876	.752	.628	.504	.256
47½	.301	.876	.752	.628	.503	.255
48¾	.301	.876	.752	.627	.503	.255
50	2.301	2.876	5.751	8.627	11.503	17.254
52½	.300	.876	.751	.627	.502	.254
55	.300	.875	.751	.626	.502	.253
56¼	.300	.875	.751	.626	.502	.252
57½	.300	.875	.751	.626	.501	.252
4 00	2.300	2.875	5.750	8.625	11.501	17.251

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
°	′	*Inches*	*Inch*
For latitude 2°	1¼	2.863	0.000
	2½	5.725	.000
	3¾	8.588	.000
	5	11.451	.000
	6¼	14.313	.000
	7½	17.176	.001
	10	22.901	.001
	12½	28.627	.002
	15	34.352	.003
For latitude 3°	1¼	2.863	0.000
	2½	5.725	.000
	3¾	8.588	.000
	5	11.451	.000
	6¼	14.314	.001
	7½	17.176	.001
	10	22.902	.002
	12½	28.627	.003
	15	34.353	.004
For latitude 4°	1¼	2.863	0.000
	2½	5.726	.000
	3¾	8.588	.000
	5	11.451	.001
	6¼	14.314	.001
	7½	17.177	.001
	10	22.902	.002
	12½	28.628	.004
	15	34.353	.005

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
4 00	2.300	2.875	5.750	8.625	11.501	17.251
02½	.300	.875	.750	.625	.500	.250
03¾	.300	.875	.750	.625	.500	.250
05	.300	.875	.750	.625	.500	.249
07½	.300	.875	.749	.624	.499	.248
10	2.300	2.875	5.749	8.624	11.498	17.247
11¼	.300	.875	.749	.624	.498	.247
12½	.300	.874	.749	.623	.498	.247
15	.299	.874	.749	.623	.497	.246
17½	.299	.874	.748	.622	.496	.245
18¾	.299	.874	.748	.622	.496	.244
20	2.299	2.874	5.748	8.622	11.496	17.244
22½	.299	.874	.748	.621	.495	.243
25	.299	.874	.747	.621	.495	.242
26¼	.299	.874	.747	.621	.494	.241
27½	.299	.873	.747	.620	.494	.241
30	2.299	2.873	5.747	8.620	11.493	17.240
32½	.299	.873	.746	.619	.493	.239
33¾	.299	.873	.746	.619	.492	.238
35	.298	.873	.746	.619	.492	.238
37½	.298	.873	.746	.618	.491	.237
40	2.298	2.873	5.745	8.618	11.491	17.236
41¼	.298	.873	.745	.618	.490	.235
42½	.298	.872	.745	.617	.490	.235
45	.298	.872	.745	.617	.489	.234
47½	.298	.872	.744	.616	.489	.233
48¾	.298	.872	.744	.616	.488	.232
50	2.298	2.872	5.744	8.616	11.488	17.232
52½	.297	.872	.744	.615	.487	.231
55	.297	.872	.743	.615	.486	.230
56¼	.297	.872	.743	.615	.486	.229
57½	.297	.871	.743	.614	.486	.229
5 00	2.297	2.871	5.742	8.614	11.485	17.227
02½	.297	.871	.742	.613	.484	.226
03¾	.297	.871	.742	.613	.484	.226
05	.297	.871	.742	.613	.484	.225
07½	.297	.871	.741	.612	.483	.224
10	2.296	2.871	5.741	8.612	11.482	17.223
11¼	.296	.870	.741	.611	.482	.222
12½	.296	.870	.741	.611	.481	.222
15	.296	.870	.740	.610	.480	.221
17½	.296	.870	.740	.610	.480	.220
18¾	.296	.870	.740	.609	.479	.219
20	2.296	2.870	5.739	8.609	11.479	17.218
22½	.296	.870	.739	.609	.478	.217
25	.295	.869	.739	.608	.477	.216
26¼	.295	.869	.738	.608	.477	.215
27½	.295	.869	.738	.607	.477	.215
30	2.295	2.869	5.738	8.607	11.476	17.214
32½	.295	.869	.738	.606	.475	.213
33¾	.295	.869	.737	.606	.475	.212
35	.295	.869	.737	.606	.474	.211
37½	.295	.868	.737	.605	.473	.210
40	2.294	2.868	5.736	8.604	11.473	17.209
41¼	.294	.868	.736	.604	.472	.208
42½	.294	.868	.736	.604	.472	.208
45	.294	.868	.735	.603	.471	.206
47½	.294	.868	.735	.603	.470	.205
48¾	.294	.867	.735	.602	.470	.204
50	2.294	2.867	5.735	8.602	11.469	17.204
52½	.294	.867	.734	.601	.468	.203
55	.293	.867	.734	.601	.468	.201
56¼	.293	.867	.734	.600	.467	.201
57½	.293	.867	.733	.600	.467	.200
6 00	2.293	2.866	5.733	8.599	11.466	17.199

Ordinates of developed parallel and meridional distances

Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 4°	1¼	2.863	0.000
	2½	5.726	.000
	3¾	8.588	.000
	5	11.451	.001
	6¼	14.314	.001
	7½	17.177	.001
	10	22.902	.002
	12½	28.628	.004
	15	34.353	.005
For latitude 5°	1¼	2.863	0.000
	2½	5.726	.000
	3¾	8.589	.000
	5	11.451	.001
	6¼	14.314	.001
	7½	17.177	.002
	10	22.903	.003
	12½	28.629	.005
	15	34.354	.007
For latitude 6°	1¼	2.863	0.000
	2½	5.726	.000
	3¾	8.589	.000
	5	11.452	.001
	6¼	14.315	.001
	7½	17.178	.002
	10	22.904	.003
	12½	28.630	.005
	15	34.356	.008

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
6 00	2.293	2.866	5.733	8.599	11.466	17.199
02½	.293	.866	.732	.599	.465	.197
03¾	.293	.866	.732	.598	.464	.197
05	.293	.866	.732	.598	.464	.196
07½	.293	.866	.732	.597	.463	.195
10	2.292	2.866	5.731	8.597	11.462	17.193
11¼	.292	.865	.731	.596	.462	.193
12½	.292	.865	.731	.596	.461	.192
15	.292	.865	.730	.595	.460	.191
17½	.292	.865	.730	.595	.460	.189
18¾	.292	.865	.730	.594	.459	.189
20	2.292	2.865	5.729	8.594	11.459	17.188
22½	.292	.864	.729	.593	.458	.187
25	.291	.864	.728	.593	.457	.185
26¼	.291	.864	.728	.592	.456	.185
27½	.291	.864	.728	.592	.456	.184
30	2.291	2.864	5.727	8.591	11.455	17.182
32½	.291	.863	.727	.590	.454	.181
33¾	.291	.863	.727	.590	.453	.180
35	.291	.863	.727	.590	.453	.180
37½	.290	.863	.726	.589	.452	.178
40	2.290	2.863	5.726	8.588	11.451	17.177
41¼	.290	.863	.725	.588	.451	.176
42½	.290	.863	.725	.588	.450	.175
45	.290	.862	.725	.587	.449	.174
47½	.290	.862	.724	.586	.448	.172
48¾	.290	.862	.724	.586	.448	.172
50	2.289	2.862	5.724	8.585	11.447	17.171
52½	.289	.862	.723	.585	.446	.169
55	.289	.861	.723	.584	.445	.168
56¼	.289	.861	.722	.583	.445	.167
57½	.289	.861	.722	.583	.444	.166
7 00	2.289	2.861	5.722	8.582	11.443	17.165
02½	.288	.861	.721	.582	.442	.163
03¾	.288	.860	.721	.581	.442	.162
05	.288	.860	.721	.581	.441	.162
07½	.288	.860	.720	.580	.440	.160
10	2.288	2.860	5.720	8.579	11.439	17.159
11¼	.288	.860	.719	.579	.439	.158
12½	.288	.859	.719	.578	.438	.157
15	.287	.859	.718	.578	.437	.156
17½	.287	.859	.718	.577	.436	.154
18¾	.287	.859	.718	.577	.435	.153
20	2.287	2.859	5.717	8.576	11.435	17.152
22½	.287	.858	.717	.575	.434	.151
25	.287	.858	.716	.575	.433	.149
26¼	.286	.858	.716	.574	.432	.148
27½	.286	.858	.716	.574	.432	.147
30	2.286	2.858	5.715	8.573	11.431	17.146
32½	.286	.857	.715	.572	.429	.144
33¾	.286	.857	.714	.572	.429	.143
35	.286	.857	.714	.571	.428	.143
37½	.285	.857	.714	.570	.427	.141
40	2.285	2.857	5.713	8.570	11.426	17.139
41¼	.285	.856	.713	.569	.426	.138
42½	.285	.856	.713	.569	.425	.138
45	.285	.856	.712	.568	.424	.136
47½	.285	.856	.711	.567	.423	.134
48¾	.284	.856	.711	.567	.422	.133
50	2.284	2.855	5.711	8.566	11.422	17.133
52½	.284	.855	.710	.565	.421	.131
55	.284	.855	.710	.565	.419	.129
56¼	.284	.855	.709	.564	.419	.128
57½	.284	.855	.709	.564	.418	.127
8 00	2.284	2.854	5.709	8.563	11.417	17.126

Ordinates of developed parallel and meridional distances

Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 6°	1¼	2.863	0.000
	2½	5.726	.000
	3¾	8.589	.000
	5	11.452	.001
	6¼	14.315	.001
	7½	17.178	.002
	10	22.904	.003
	12½	28.630	.005
	15	34.356	.008
For latitude 7°	1¼	2.863	0.000
	2½	5.726	.000
	3¾	8.589	.001
	5	11.452	.001
	6¼	14.315	.002
	7½	17.179	.002
	10	22.905	.004
	12½	28.631	.006
	15	34.357	.009
For latitude 8°	1¼	2.863	0.000
	2½	5.726	.000
	3¾	8.590	.001
	5	11.453	.001
	6¼	14.316	.002
	7½	17.179	.003
	10	22.906	.005
	12½	28.632	.007
	15	34.359	.010

TABLE 3.—*Coordinates for the projection of maps, scale $\frac{1}{31680}$*—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
8 00	2. 284	2. 854	5. 709	8. 563	11. 417	17. 126
02½	. 283	. 854	. 708	. 562	. 416	. 124
03¾	. 283	. 854	. 708	. 561	. 415	. 123
05	. 283	. 854	. 707	. 561	. 415	. 122
07½	. 283	. 853	. 707	. 560	. 414	. 120
10	2. 283	2. 853	5. 706	8. 559	11. 412	17. 119
11¼	. 282	. 853	. 706	. 559	. 412	. 118
12½	. 282	. 853	. 706	. 558	. 411	. 117
15	. 282	. 853	. 705	. 558	. 410	. 115
17½	. 282	. 852	. 704	. 557	. 409	. 113
18¾	. 282	. 852	. 704	. 556	. 408	. 112
20	2. 282	2. 852	5. 704	8. 556	11. 408	17. 111
22½	. 282	. 852	. 703	. 555	. 406	. 110
25	. 282	. 851	. 703	. 554	. 405	. 108
26¼	. 282	. 851	. 702	. 553	. 405	. 107
27½	. 282	. 851	. 702	. 553	. 404	. 106
30	2. 281	2. 851	5. 701	8. 552	11. 403	17. 104
32½	. 280	. 850	. 701	. 551	. 402	. 102
33¾	. 280	. 850	. 700	. 551	. 401	. 101
35	. 280	. 850	. 700	. 550	. 400	. 100
37½	. 280	. 850	. 699	. 549	. 399	. 099
40	2. 280	2. 849	5. 699	8. 548	11. 398	17. 097
41¼	. 279	. 849	. 699	. 548	. 397	. 096
42½	. 279	. 849	. 698	. 547	. 397	. 095
45	. 279	. 849	. 698	. 546	. 395	. 093
47½	. 279	. 848	. 697	. 545	. 394	. 091
48¾	. 279	. 848	. 697	. 545	. 393	. 090
50	2. 279	2. 848	5. 696	8. 545	11. 393	17. 089
52½	. 278	. 848	. 696	. 544	. 391	. 087
55	. 278	. 848	. 695	. 543	. 390	. 085
56¼	. 278	. 847	. 695	. 542	. 389	. 084
57½	. 278	. 847	. 694	. 542	. 389	. 083
9 00	2. 278	2. 847	5. 694	8. 541	11. 388	17. 081
02½	. 277	. 847	. 693	. 540	. 386	. 079
03¾	. 277	. 846	. 693	. 539	. 386	. 078
05	. 277	. 846	. 692	. 539	. 385	. 077
07½	. 277	. 846	. 692	. 538	. 384	. 075
10	2. 276	2. 846	5. 691	8. 537	11. 382	17. 073
11¼	. 276	. 845	. 691	. 536	. 382	. 072
12½	. 276	. 845	. 690	. 536	. 381	. 071
15	. 276	. 845	. 690	. 535	. 380	. 069
17½	. 276	. 845	. 689	. 534	. 378	. 067
18¾	. 275	. 844	. 689	. 533	. 378	. 066
20	2. 275	2. 844	5. 688	8. 533	11. 377	17. 065
22½	. 275	. 844	. 688	. 532	. 376	. 063
25	. 275	. 844	. 687	. 531	. 374	. 061
26¼	. 275	. 843	. 687	. 530	. 373	. 060
27½	. 275	. 843	. 686	. 530	. 373	. 059
30	2. 274	2. 843	5. 686	8. 529	11. 371	17. 057
32½	. 274	. 843	. 685	. 528	. 370	. 055
33¾	. 274	. 842	. 685	. 527	. 369	. 054
35	. 274	. 842	. 684	. 527	. 369	. 053
37½	. 273	. 842	. 684	. 526	. 367	. 051
40	2. 273	2. 841	5. 683	8. 524	11. 366	17. 049
41¼	. 273	. 841	. 683	. 524	. 365	. 048
42½	. 273	. 841	. 682	. 523	. 365	. 047
45	. 273	. 841	. 682	. 522	. 363	. 045
47½	. 272	. 840	. 681	. 521	. 362	. 043
48¾	. 272	. 840	. 680	. 521	. 361	. 041
50	2. 272	2. 840	5. 680	8. 520	11. 360	17. 040
52½	. 272	. 840	. 679	. 519	. 359	. 038
55	. 271	. 839	. 679	. 518	. 357	. 036
56¼	. 271	. 839	. 678	. 518	. 357	. 035
57½	. 271	. 839	. 678	. 517	. 356	. 034
10 00	2. 271	2. 839	5. 677	8. 516	11. 355	17. 032

Ordinates of developed parallel and meridional distances

Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 8°	1¼	2. 863	0. 000
	2½	5. 726	. 000
	3¾	8. 590	. 001
	5	11. 453	. 001
	6¼	14. 316	. 002
	7½	17. 179	. 003
	10	22. 906	. 005
	12½	28. 632	. 007
	15	34. 359	. 010
For latitude 9°	1¼	2. 863	0. 000
	2½	5. 727	. 000
	3¾	8. 590	. 001
	5	11. 453	. 001
	6¼	14. 317	. 002
	7½	17. 180	. 003
	10	22. 907	. 005
	12½	28. 634	. 008
	15	34. 360	. 012
For latitude 10°	1¼	2. 864	0. 000
	2½	5. 727	. 000
	3¾	8. 591	. 001
	5	11. 454	. 001
	6¼	14. 318	. 002
	7½	17. 181	. 003
	10	22. 908	. 006
	12½	28. 635	. 009
	15	34. 362	. 013

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$—Continued

Latitude of parallel	Abscissas of developed parallel					
	Longitude interval					
	1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
10 00	2. 271	2. 839	5. 677	8. 516	11. 355	17. 032
02½	. 271	. 838	. 677	. 515	. 353	. 030
03¾	. 270	. 838	. 676	. 514	. 353	. 029
05	. 270	. 838	. 676	. 514	. 352	. 027
07½	. 270	. 838	. 675	. 513	. 350	. 025
10	2. 270	2. 837	5. 674	8. 512	11. 349	17. 023
11¼	. 270	. 837	. 674	. 511	. 348	. 022
12½	. 269	. 837	. 674	. 510	. 347	. 021
15	. 269	. 836	. 673	. 509	. 346	. 019
17½	. 269	. 836	. 672	. 508	. 344	. 016
18¾	. 269	. 836	. 672	. 508	. 344	. 115
20	2. 269	2. 836	5. 671	8. 507	11. 343	17. 014
22½	. 268	. 835	. 671	. 506	. 341	. 012
25	. 268	. 835	. 670	. 505	. 340	. 010
26¼	. 268	. 835	. 670	. 504	. 339	. 009
27½	. 268	. 835	. 669	. 504	. 338	. 007
30	2. 267	2. 834	5. 668	8. 503	11. 337	17. 005
32½	. 267	. 834	. 668	. 501	. 335	. 003
33¾	. 267	. 834	. 667	. 501	. 334	. 002
35	. 267	. 833	. 667	. 500	. 334	. 001
37½	. 266	. 233	. 666	. 499	. 332	16. 998
40	2. 266	2. 833	5. 665	8. 498	11. 331	16. 996
41¼	. 266	. 832	. 665	. 497	. 330	. 995
42½	. 266	. 832	. 665	. 497	. 329	. 994
45	. 266	. 832	. 664	. 496	. 328	. 991
47½	. 265	. 832	. 663	. 495	. 326	. 989
48¾	. 265	. 831	. 663	. 494	. 325	. 988
50	2. 265	2. 831	5. 662	8. 493	11. 324	16. 987
52½	. 265	. 831	. 661	. 492	. 323	. 984
55	. 264	. 830	. 661	. 491	. 321	. 982
56¼	. 264	. 830	. 660	. 490	. 320	. 981
57½	. 264	. 830	. 660	. 490	. 320	980
11 00	2. 264	2. 830	5. 659	8. 489	11. 318	16. 977
02½	. 263	. 829	. 658	. 487	. 317	. 975
03¾	. 263	. 829	. 658	. 487	. 316	. 974
05	. 263	. 829	. 657	. 486	. 315	. 972
07½	. 263	. 828	. 657	. 485	. 313	. 970
10	2. 262	2. 828	5. 656	8. 484	11. 312	16. 968
11¼	. 262	. 828	. 655	. 483	. 311	. 966
12½	. 262	. 828	. 655	. 483	. 310	. 965
15	. 262	. 827	. 654	. 481	. 308	. 963
17½	. 261	. 827	. 653	. 480	. 307	. 960
18¾	. 261	. 827	. 653	. 480	. 306	. 959
20	2. 261	2. 826	5. 653	8. 479	11. 305	16. 958
22½	. 261	. 826	. 652	. 478	. 304	. 955
25	. 260	. 825	. 651	. 476	. 302	. 953
26¼	. 260	. 825	. 651	. 476	. 301	. 952
27½	. 260	. 825	. 650	. 475	. 300	. 950
30	2. 260	2. 825	5. 649	8. 474	11. 299	16. 948
32½	. 259	. 824	. 648	. 473	. 297	. 945
33¾	. 259	. 824	. 648	. 472	. 296	. 944
35	. 259	. 824	. 648	. 471	. 295	. 943
37½	. 259	. 823	. 647	. 470	. 294	. 940
40	2. 258	2. 823	5. 646	8. 469	11. 292	16. 938
41¼	. 258	. 823	. 646	. 468	. 291	. 937
42½	. 258	. 823	. 645	. 468	. 290	. 935
45	. 258	. 822	. 644	. 466	. 289	. 933
47½	. 257	. 822	. 643	. 465	. 287	. 930
48¾	. 257	. 822	. 643	. 465	. 286	. 929
50	2. 257	2. 821	5. 643	8. 464	11. 285	16. 928
52½	. 257	. 821	. 642	. 463	. 283	. 925
55	. 256	. 820	. 641	. 461	. 282	. 923
56¼	. 256	. 820	. 640	. 461	. 281	. 921
57½	. 256	. 820	. 640	. 460	. 280	. 920
12 00	2. 256	2. 820	5. 639	8. 459	11. 278	16. 917

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 10°	1¼	2. 864	0. 000
	2½	5. 727	. 000
	3¾	8. 591	. 001
	5	11. 454	. 001
	6¼	14. 318	. 002
	7½	17. 181	. 003
	10	22. 908	. 006
	12½	28. 635	. 009
	15	34. 362	. 013
For latitude 11°	1¼	2. 864	0. 000
	2½	5. 727	. 000
	3¾	8. 591	. 001
	5	11. 455	. 002
	6¼	14. 319	. 002
	7½	17. 182	. 004
	10	22. 910	. 006
	12½	28. 637	. 010
	15	34. 365	. 014
For latitude 12°	1¼	2. 864	0. 000
	2½	5. 728	. 000
	3¾	8. 592	. 001
	5	11. 456	. 002
	6¼	14. 320	. 003
	7½	17. 183	. 004
	10	22. 911	. 007
	12½	28. 639	. 011
	15	34. 367	. 015

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$—Continued

Latitude of parallel	Abscissas of developed parallel					
	Longitude interval					
	1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
12 00	2.256	2.820	5.639	8.459	11.278	16.917
02½	.255	.819	.638	.457	.276	.915
03¾	.255	.819	.638	.457	.276	.913
05	.255	.819	.637	.456	.275	.912
07½	.255	.818	.637	.455	.273	.910
10	2.254	2.818	5.636	8.453	11.271	16.907
11¼	.254	.818	.635	.453	.270	.906
12½	.254	.817	.635	.452	.270	.904
15	.254	.817	.634	.451	.268	.902
17½	.253	.816	.633	.449	.266	.899
18¾	.253	.816	.633	.449	.265	.898
20	2.253	2.816	5.632	8.448	11.264	16.896
22½	.252	.816	.631	.447	.262	.894
25	.252	.815	.630	.445	.261	.891
26¼	.252	.815	.630	.445	.260	.890
27½	.252	.815	.629	.444	.259	.888
30	2.251	2.814	5.629	8.443	11.257	16.886
32½	.251	.814	.628	.441	.255	.883
33¾	.251	.814	.627	.441	.254	.881
35	.251	.813	.627	.440	.253	.880
37½	.250	.813	.626	.439	.252	.877
40	2.250	2.812	5.625	8.437	11.250	16.875
41¼	.250	.812	.624	.437	.249	.873
42½	.250	.812	.624	.436	.248	.872
45	.249	.812	.623	.435	.246	.869
47½	.249	.811	.622	.433	.244	.866
48¾	.249	.811	.622	.433	.243	.865
50	2.248	2.811	5.621	8.432	11.242	16.864
52½	.248	.810	.620	.430	.241	.861
55	.248	.810	.619	.429	.239	.858
56¼	.248	.809	.619	.428	.238	.857
57½	.247	.809	.618	.428	.237	.855
13 00	2.247	2.809	5.618	8.426	11.235	16.852
02½	.247	.808	.617	.425	.233	.850
03¾	.246	.808	.616	.424	.232	.848
05	.246	.808	.616	.423	.231	.847
07½	.246	.807	.615	.422	.229	.844
10	2.246	2.807	5.614	8.421	11.227	16.841
11¼	.245	.807	.613	.420	.226	.840
12½	.245	.806	.613	.419	.226	.838
15	.245	.806	.612	.418	.224	.835
17½	.244	.805	.611	.416	.222	.833
18¾	.244	.805	.610	.416	.221	.831
20	2.244	2.805	5.610	8.415	11.220	16.830
22½	.244	.804	.609	.413	.218	.827
25	.243	.804	.608	.412	.216	.824
26¼	.243	.804	.608	.411	.215	.823
27½	.243	.804	.607	.411	.214	.821
30	2.242	2.803	5.606	8.409	11.212	16.818
32½	.242	.803	.605	.408	.210	.815
33¾	.242	.802	.605	.407	.209	.814
35	.242	.802	.604	.406	.208	.812
37½	.241	.802	.603	.405	.206	.809
40	2.241	2.801	5.602	8.403	11.204	16.806
41¼	.241	.801	.602	.402	.203	.805
42½	.240	.801	.601	.402	.202	.803
45	.240	.800	.600	.400	.200	.800
47½	.240	.800	.599	.399	.198	.797
48¾	.239	.799	.599	.398	.197	.796
50	2.239	2.799	5.598	8.397	11.196	16.795
52½	.239	.799	.597	.396	.194	.792
55	.238	.798	.596	.394	.192	.789
56¼	.238	.798	.596	.394	.191	.787
57½	.238	.798	.595	.393	.190	.786
14 00	2.238	2.797	5.594	8.391	11.188	16.782

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 12°	1¼	2.864	0.000
	2½	5.728	.000
	3¾	8.592	.001
	5	11.456	.002
	6¼	14.320	.003
	7½	17.183	.004
	10	22.911	.007
	12½	28.639	.011
	15	34.367	.015
For latitude 13°	1¼	2.864	0.000
	2½	5.728	.000
	3¾	8.592	.001
	5	11.456	.002
	6¼	14.321	.003
	7½	17.185	.004
	10	22.913	.007
	12½	28.641	.011
	15	34.370	.017
For latitude 14°	1¼	2.864	0.000
	2½	5.729	.000
	3¾	8.593	.001
	5	11.457	.002
	6¼	14.322	.003
	7½	17.186	.004
	10	22.915	.008
	12½	28.644	.012
	15	34.372	.018

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
14 00	2.238	2.797	5.594	8.391	11.188	16.782
02½	.237	.797	.593	.390	.186	.780
03¾	.237	.796	.593	.389	.185	.778
05	.237	.796	.592	.388	.184	.776
07½	.236	.796	.591	.387	.182	.773
10	2.236	2.795	5.590	8.385	11.180	16.770
11¼	.236	.795	.590	.384	.179	.769
12½	.236	.795	.589	.384	.178	.767
15	.235	.794	.588	.382	.176	.764
17½	.235	.794	.587	.381	.174	.761
18¾	.235	.793	.587	.380	.173	.760
20	2.234	2.793	5.586	8.379	11.172	16.758
22½	.234	.792	.585	.377	.170	.755
25	.234	.792	.584	.376	.168	.752
26¼	.233	.792	.583	.375	.167	.750
27½	.233	.791	.583	.374	.166	.749
30	2.233	2.791	5.582	8.373	11.164	16.745
32½	.232	.790	.581	.371	.162	.742
33¾	.232	.790	.580	.370	.161	.741
35	.232	.790	.580	.370	.160	.739
37½	.232	.789	.579	.368	.157	.736
40	2.231	2.789	5.578	8.366	11.155	16.733
41¼	.231	.789	.577	.366	.154	.731
42½	.231	.788	.577	.365	.153	.730
45	.230	.788	.576	.363	.151	.727
47½	.230	.787	.574	.362	.149	.723
48¾	.230	.787	.574	.361	.148	.722
50	2.229	2.787	5.573	8.360	11.147	16.720
52½	.229	.786	.572	.359	.145	.717
55	.229	.786	.571	.357	.143	.714
56¼	.228	.785	.571	.356	.141	.712
57½	.228	.785	.570	.355	.140	.711
15 00	2.228	2.785	5.569	8.354	11.138	16.707
02½	.227	.784	.568	.352	.136	.704
03¾	.227	.784	.568	.351	.135	.703
05	.227	.783	.567	.350	.134	.701
07½	.226	.783	.566	.349	.132	.698
10	2.226	2.782	5.565	8.347	11.130	16.694
11¼	.226	.782	.564	.346	.129	.693
12½	.225	.782	.564	.346	.127	.691
15	.225	.781	.563	.344	.125	.688
17½	.225	.781	.562	.342	.123	.685
18¾	.224	.780	.561	.341	.122	.683
20	2.224	2.780	5.560	8.341	11.121	16.681
22½	.224	.780	.559	.339	.119	.678
25	.224	.779	.558	.337	.116	.675
26¼	.223	.779	.558	.336	.115	.673
27½	.223	.779	.557	.336	.114	.671
30	2.222	2.778	5.556	8.334	11.112	16.668
32½	.222	.777	.555	.332	.110	.665
33¾	.222	.777	.554	.331	.109	.663
35	.222	.777	.554	.331	.107	.661
37½	.221	.776	.553	.329	.105	.658
40	2.221	2.776	5.552	8.327	11.103	16.654
41¼	.220	.775	.551	.326	.102	.653
42½	.220	.775	.550	.326	.101	.651
45	.220	.775	.549	.324	.098	.648
47½	.219	.774	.548	.322	.096	.644
48¾	.219	.774	.548	.321	.095	.643
50	2.219	2.773	5.547	8.320	11.094	16.641
52½	.218	.773	.546	.319	.092	.637
55	.218	.772	.545	.317	.089	.634
56¼	.218	.772	.544	.316	.088	.632
57½	.217	.772	.544	.315	.087	.631
16 00	2.217	2.771	5.542	8.314	11.085	16.627

Ordinates of developed parallel and meridional distances

Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 14°	1¼	2.864	0.000
	2½	5.729	.000
	3¾	8.593	.001
	5	11.457	.002
	6¼	14.322	.003
	7½	17.186	.004
	10	22.915	.008
	12½	28.644	.012
	15	34.372	.018
For latitude 15°	1¼	2.865	0.000
	2½	5.729	.001
	3¾	8.594	.001
	5	11.458	.002
	6¼	14.323	.003
	7½	17.188	.005
	10	22.917	.008
	12½	28.646	.013
	15	34.375	.019
For latitude 16°	1¼	2.865	0.000
	2½	5.730	.001
	3¾	8.595	.001
	5	11.459	.002
	6¼	14.325	.003
	7½	17.189	.005
	10	22.919	.009
	12½	28.649	.014
	15	34.379	.020

TABLE 3.—*Coordinates for the projection of maps, scale $\frac{1}{31680}$*—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval					
	1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
16 00	2.217	2.771	5.542	8.314	11.085	16.627
02½	.216	.771	.541	.312	.083	.624
03¾	.216	.770	.541	.311	.081	.622
05	.216	.770	.540	.310	.080	.620
07½	.216	.769	.539	.308	.078	.617
10	2.215	2.769	5.538	8.307	11.076	16.613
11¼	.215	.769	.537	.306	.074	.612
12½	.215	.768	.537	.305	.073	.610
15	.214	.768	.535	.303	.071	.606
17½	.214	.767	.534	.301	.069	.603
18¾	.213	.767	.534	.301	.067	.601
20	2.213	2.767	5.533	8.300	11.066	16.599
22½	.213	.766	.532	.298	.064	.596
25	.212	.765	.531	.296	.062	.592
26¼	.212	.765	.530	.295	.060	.590
27½	.212	.765	.530	.294	.059	.589
30	2.211	2.764	5.528	8.293	11.057	16.585
32½	.211	.764	.527	.291	.054	.582
33¾	.211	.763	.527	.290	.053	.580
35	.210	.763	.526	.289	.052	.578
37½	.210	.762	.525	.287	.050	.575
40	2.209	2.762	5.524	8.286	11.047	16.571
41¼	.209	.762	.523	.285	.046	.569
42½	.209	.761	.522	.284	.045	.567
45	.208	.761	.521	.282	.043	.564
47½	.208	.760	.520	.280	.040	.560
48¾	.208	.760	.519	.279	.039	.558
50	2.208	2.759	5.519	8.278	11.038	16.557
52½	.207	.759	.518	.276	.035	.553
55	.207	.758	.516	.275	.033	.549
56¼	.206	.758	.516	.274	.032	.547
57½	.206	.758	.515	.273	.030	.546
17 00	2.206	2.757	5.514	8.271	11.028	16.542
02½	.205	.756	.513	.269	.026	.538
03¾	.205	.756	.512	.268	.024	.536
05	.205	.756	.512	.267	.023	.535
07½	.204	.755	.510	.266	.021	.531
10	2.204	2.755	5.509	8.264	11.018	16.527
11¼	.203	.754	.509	.263	.017	.526
12½	.203	.754	.508	.262	.016	.524
15	.203	.753	.507	.260	.013	.520
17½	.202	.753	.505	.258	.011	.516
18¾	.202	.752	.505	.257	.010	.514
20	2.202	2.752	5.504	8.256	11.008	16.512
22½	.201	.751	.503	.254	.006	.509
25	.201	.751	.502	.253	.003	.505
26¼	.200	.751	.501	.252	.002	.503
27½	.200	.750	.500	.251	.001	.501
30	2.200	2.750	5.499	8.249	10.998	16.498
32½	.199	.749	.498	.247	.996	.494
33¾	.199	.749	.497	.246	.995	.492
35	.199	.748	.497	.245	.993	.490
37½	.198	.748	.495	.243	.991	.486
40	2.198	2.747	5.494	8.241	10.988	16.482
41¼	.197	.747	.494	.240	.987	.481
42½	.197	.746	.493	.239	.986	.479
45	.197	.746	.492	.237	.983	.475
47½	.196	.745	.490	.235	.981	.471
48¾	.196	.745	.490	.235	.979	.469
50	2.196	2.745	5.489	8.234	10.978	16.467
52½	.195	.744	.488	.232	.976	.463
55	.195	.743	.486	.230	.973	.459
56¼	.194	.743	.486	.229	.972	.458
57½	.194	.743	.485	.228	.970	.456
18 00	2.194	2.742	5.484	8.226	10.968	16.452

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 16°	1¼	2.865	0.000
	2½	5.730	.001
	3¾	8.595	.001
	5	11.459	.002
	6¼	14.325	.003
	7½	17.189	.005
	10	22.919	.009
	12½	28.649	.014
	15	34.379	.020
For latitude 17°	1¼	2.865	0.000
	2½	5.730	.001
	3¾	8.595	.001
	5	11.461	.002
	6¼	14.326	.004
	7½	17.191	.005
	10	22.921	.009
	12½	28.652	.014
	15	34.382	.021
For latitude 18°	1¼	2.865	0.000
	2½	5.731	.001
	3¾	8.596	.001
	5	11.462	.002
	6¼	14.327	.004
	7½	17.193	.006
	10	22.923	.010
	12½	28.654	.015
	15	34.385	.022

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$—Continued

Latitude of parallel	Abscissas of developed parallel					
	Longitude interval					
	1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
18 00	2.194	2.742	5.484	8.226	10.968	16.452
02½	.193	.741	.483	.224	.965	.448
03¾	.193	.741	.482	.223	.964	.446
05	.193	.741	.481	.222	.963	.444
07½	.192	.740	.480	.220	.960	.440
10	2.191	2.739	5.479	8.218	10.958	16.436
11¼	.191	.739	.478	.217	.956	.434
12½	.191	.739	.477	.216	.955	.432
15	.190	.738	.476	.214	.952	.428
17½	.190	.737	.475	.212	.950	.424
18¾	.190	.737	.474	.211	.948	.423
20	2.189	2.737	5.474	8.210	10.947	16.421
22½	.189	.736	.472	.208	.944	.417
25	.188	.735	.471	.206	.942	.413
26¼	.188	.735	.470	.205	.941	.411
27½	.188	.735	.470	.204	.939	.409
30	2.187	2.734	5.468	8.202	10.937	16.405
32½	.187	.733	.467	.200	.934	.401
33¾	.187	.733	.466	.199	.933	.399
35	.186	.733	.466	.198	.931	.397
37½	.186	.732	.464	.196	.929	.393
40	2.185	2.731	5.463	8.194	10.926	16.389
41¼	.185	.731	.462	.193	.925	.387
42½	.185	.731	.462	.192	.923	.385
45	.184	.730	.460	.190	.921	.381
47½	.184	.729	.459	.188	.918	.377
48¾	.183	.729	.458	.187	.917	.375
50	2.183	2.729	5.458	8.186	10.915	16.373
52½	.183	.728	.456	.184	.913	.369
55	.182	.727	.455	.182	.910	.365
56¼	.182	.727	.454	.181	.908	.363
57½	.181	.727	.454	.180	.907	.361
19 00	2.181	2.726	5.452	8.178	10.904	16.357
02½	.180	.725	.451	.176	.902	.353
03¾	.180	.725	.450	.175	.900	.350
05	.180	.725	.449	.174	.899	.348
07½	.179	.724	.448	.172	.896	.344
10	2.179	2.723	5.447	8.170	10.893	16.340
11¼	.178	.723	.446	.169	.892	.338
12½	.178	.723	.445	.168	.891	.336
15	.178	.722	.444	.166	.888	.332
17½	.177	.721	.443	.164	.885	.328
18¾	.177	.721	.442	.163	.884	.326
20	2.177	2.721	5.441	8.162	10.883	16.324
22½	.176	.720	.440	.160	.880	.320
25	.175	.719	.438	.158	.877	.315
26¼	.175	.719	.438	.157	.876	.313
27½	.175	.719	.437	.156	.874	.311
30	2.174	2.718	5.436	8.154	10.871	16.307
32½	.174	.717	.434	.151	.869	.303
33¾	.173	.717	.434	.150	.867	.301
35	.173	.716	.433	.149	.866	.299
37½	.173	.716	.431	.147	.863	.294
40	2.172	2.715	5.430	8.145	10.860	16.290
41¼	.172	.715	.429	.144	.859	.288
42½	.172	.714	.429	.143	.857	.286
45	.171	.714	.427	.141	.855	.282
47½	.170	.713	.426	.139	.852	.278
48¾	.170	.713	.425	.138	.850	.276
50	2.170	2.712	5.424	8.137	10.849	16.273
52½	.169	.712	.423	.135	.846	.269
55	.169	.711	.422	.132	.843	.265
56¼	.168	.710	.421	.131	.842	.263
57½	.168	.710	.420	.130	.840	.261
20 00	2.167	2.709	5.419	8.128	10.838	16.256

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 18°	1¼	2.865	0.000
	2½	5.731	.001
	3¾	8.596	.001
	5	11.462	.002
	6¼	14.327	.004
	7½	17.193	.006
	10	22.923	.010
	12½	28.654	.015
	15	34.385	.022
For latitude 19°	1¼	2.866	0.000
	2½	5.731	.001
	3¾	8.597	.001
	5	11.463	.003
	6¼	14.329	.004
	7½	17.194	.006
	10	22.926	.010
	12½	28.657	.016
	15	34.389	.023
For latitude 20°	1¼	2.866	0.000
	2½	5.732	.001
	3¾	8.598	.002
	5	11.464	.003
	6¼	14.330	.004
	7½	17.196	.006
	10	22.929	.011
	12½	28.661	.017
	15	34.393	.024

TABLE 3.—*Coordinates for the projection of maps, scale $\frac{1}{31680}$*—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval: 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
20 00	2.167	2.709	5.419	8.128	10.838	16.256
02½	.167	.709	.417	.126	.835	.252
03¾	.167	.708	.417	.125	.833	.250
05	.166	.708	.416	.124	.832	.248
07½	.166	.707	.414	.122	.829	.243
10	2.165	2.707	5.413	8.120	10.826	16.239
11¼	.165	.706	.412	.119	.825	.237
12½	.165	.706	.412	.117	.823	.235
15	.164	.705	.410	.115	.820	.231
17½	.163	.704	.409	.113	.817	.226
18¾	.163	.704	.408	.112	.816	.224
20	2.163	2.704	5.407	8.111	10.815	16.222
22½	.162	.703	.406	.109	.812	.217
25	.162	.702	.404	.107	.809	.213
26¼	.161	.702	.404	.105	.807	.211
27½	.161	.701	.403	.104	.806	.209
30	2.161	2.701	5.401	8.102	10.803	16.204
32½	.160	.700	.400	.100	.800	.200
33¾	.160	.700	.399	.099	.799	.198
35	.159	.699	.399	.098	.797	.196
37½	.159	.699	.397	.096	.794	.191
40	2.158	2.698	5.396	8.093	10.791	16.187
41¼	.158	.697	.395	.092	.790	.185
42½	.158	.697	.394	.091	.788	.182
45	.157	.696	.393	.089	.785	.178
47½	.156	.696	.391	.087	.782	.174
48¾	.156	.695	.390	.086	.781	.171
50	2.156	2.695	5.390	8.085	10.779	16.169
52½	.155	.694	.388	.082	.776	.165
55	.155	.693	.387	.080	.773	.160
56¼	.154	.693	.386	.079	.772	.158
57½	.154	.693	.385	.079	.770	.156
21 00	2.154	2.692	5.384	8.076	10.768	16.151
02½	.153	.691	.382	.073	.764	.147
03¾	.153	.691	.382	.072	.763	.145
05	.152	.690	.381	.071	.762	.142
07½	.152	.690	.379	.069	.759	.138
10	2.151	2.689	5.378	8.067	10.756	16.133
11¼	.151	.688	.377	.066	.754	.131
12½	.150	.688	.376	.064	.752	.129
15	.150	.687	.375	.062	.749	.124
17½	.149	.687	.373	.060	.746	.120
18¾	.149	.686	.372	.059	.745	.117
20	2.149	2.686	5.372	8.058	10.743	16.115
22½	.148	.685	.370	.055	.740	.111
25	.147	.684	.369	.053	.737	.106
26¼	.147	.684	.368	.052	.736	.104
27½	.147	.684	.367	.051	.734	.102
30	2.146	2.683	5.366	8.048	10.731	16.097
32½	.146	.682	.364	.046	.728	.092
33¾	.145	.682	.363	.045	.727	.090
35	.145	.681	.363	.044	.725	.088
37½	.144	.681	.361	.042	.722	.083
40	2.144	2.680	5.359	8.039	10.719	16.078
41¼	.144	.679	.359	.038	.717	.076
42½	.143	.679	.358	.037	.716	.074
45	.143	.678	.356	.035	.713	.069
47½	.142	.677	.355	.032	.710	.065
48¾	.142	.677	.354	.031	.708	.062
50	2.141	2.677	5.353	8.030	10.707	16.060
52½	.141	.676	.352	.028	.703	.055
55	.140	.675	.350	.025	.700	.051
56¼	.140	.675	.349	.024	.699	.048
57½	.140	.674	.349	.023	.697	.046
22 00	2.139	2.674	5.347	8.021	10.694	16.041

Ordinates of developed parallel and meridional distances

Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 20°	1¼	2.866	0.000
	2½	5.732	.001
	3¾	8.598	.002
	5	11.464	.003
	6¼	14.330	.004
	7½	17.196	.006
	10	22.929	.011
	12½	28.661	.017
	15	34.393	.024
For latitude 21°	1¼	2.866	0.000
	2½	5.733	.001
	3¾	8.599	.002
	5	11.466	.003
	6¼	14.332	.004
	7½	17.198	.006
	10	22.931	.011
	12½	28.664	.018
	15	34.397	.025
For latitude 22°	1¼	2.867	0.000
	2½	5.733	.001
	3¾	8.600	.002
	5	11.467	.003
	6¼	14.334	.005
	7½	17.201	.007
	10	22.934	.012
	12½	28.668	.018
	15	34.401	.026

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
22 00	2.139	2.674	5.347	8.021	10.694	16.041
02½	.138	.673	.346	.018	.691	.037
03¾	.138	.672	.345	.017	.690	.034
05	.138	.672	.344	.016	.688	.032
07½	.137	.671	.342	.014	.685	.027
10	2.136	2.670	5.341	8.011	10.682	16.022
11¼	.136	.670	.340	.010	.680	.020
12½	.136	.670	.339	.009	.678	.018
15	.135	.669	.338	.006	.675	.013
17½	.134	.668	.336	.004	.672	.008
18¾	.134	.668	.335	.003	.671	.006
20	2.134	2.667	5.334	8.002	10.669	16.003
22½	.133	.666	.333	7.999	.666	15.999
25	.133	.666	.331	.997	.663	.994
26¼	.132	.665	.331	.996	.661	.992
27½	.132	.665	.330	.995	.659	.989
30	2.131	2.664	5.328	7.992	10.656	15.984
32½	.131	.663	.327	.990	.653	.980
33¾	.130	.663	.326	.989	.652	.977
35	.130	.662	.325	.987	.650	.975
37½	.129	.662	.323	.985	.647	.970
40	2.129	2.661	5.322	7.983	10.643	15.965
41¼	.128	.660	.321	.981	.642	.963
42½	.128	.660	.320	.980	.640	.960
45	.127	.659	.319	.978	.637	.956
47½	.127	.658	.317	.975	.634	.951
48¾	.126	.658	.316	.974	.632	.948
50	2.126	2.658	5.315	7.973	10.631	15.946
52½	.125	.657	.314	.970	.627	.941
55	.125	.656	.312	.968	.624	.936
56¼	.124	.656	.311	.967	.622	.934
57½	.124	.655	.310	.966	.621	.931
23 00	2.123	2.654	5.309	7.963	10.618	15.926
02½	.123	.654	.307	.961	.614	.921
03¾	.123	.653	.306	.960	.613	.919
05	.122	.653	.306	.958	.611	.917
07½	.122	.652	.304	.956	.608	.912
10	2.121	2.651	5.302	7.953	10.605	15.907
11¼	.121	.651	.301	.952	.603	.904
12½	.120	.650	.301	.951	.601	.902
15	.120	.649	.299	.948	.598	.897
17½	.119	.649	.297	.946	.595	.892
18¾	.119	.648	.297	.945	.593	.890
20	2.118	2.648	5.296	7.944	10.591	15.887
22½	.118	.647	.294	.941	.588	.882
25	.117	.646	.292	.939	.585	.877
26¼	.117	.646	.292	.937	.583	.875
27½	.116	.645	.291	.936	.581	.872
30	2.116	2.645	5.289	7.934	10.578	15.867
32½	.115	.644	.287	.931	.575	.862
33¾	.115	.643	.287	.930	.573	.860
35	.114	.643	.286	.929	.571	.857
37½	.114	.642	.284	.926	.568	.852
40	2.113	2.641	5.282	7.924	10.565	15.847
41¼	.113	.641	.282	.922	.563	.845
42½	.112	.640	.281	.921	.561	.842
45	.112	.640	.279	.919	.558	.837
47½	.111	.639	.277	.916	.555	.832
48¾	.111	.638	.277	.915	.553	.830
50	2.110	2.638	5.276	7.913	10.551	15.827
52½	.110	.637	.274	.911	.548	.822
55	.109	.636	.272	.908	.545	.817
56¼	.109	.636	.271	.907	.543	.814
57½	.108	.635	.271	.906	.541	.812
24 00	2.108	2.634	5.269	7.903	10.538	15.807

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 22°	1¼	2.867	0.000
	2½	5.733	.001
	3¾	8.600	.002
	5	11.467	.003
	6¼	14.334	.005
	7½	17.201	.007
	10	22.934	.012
	12½	28.668	.018
	15	34.401	.026
For latitude 23°	1¼	2.867	0.000
	2½	5.734	.001
	3¾	8.601	.002
	5	11.468	.003
	6¼	14.336	.005
	7½	17.203	.007
	10	22.937	.012
	12½	28.672	.019
	15	34.405	.027
For latitude 24°	1¼	2.867	0.000
	2½	5.735	.001
	3¾	8.602	.002
	5	11.470	.003
	6¼	14.338	.005
	7½	17.205	.007
	10	22.940	.012
	12½	28.675	.019
	15	34.410	.028

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$—Continued

Latitude of parallel		Abscissas of developed parallel					
		Longitude interval					
		1′	1¼′	2½′	3¾′	5′	7½′
°	′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
24	00	2.108	2.634	5.269	7.903	10.538	15.807
	02½	.107	.634	.267	.901	.534	.802
	03¾	.107	.633	.266	.899	.533	.799
	05	.106	.633	.265	.898	.531	.796
	07½	.105	.632	.264	.896	.527	.791
	10	2.105	2.631	5.262	7.893	10.524	15.786
	11¼	.104	.631	.261	.892	.522	.784
	12½	.104	.630	.260	.891	.521	.781
	15	.103	.629	.259	.888	.517	.776
	17½	.103	.629	.257	.885	.514	.771
	18¾	.102	.628	.256	.884	.512	.768
	20	2.102	2.628	5.255	7.883	10.510	15.766
	22½	.101	.628	.254	.880	.507	.760
	25	.101	.626	.252	.878	.504	.755
	26¼	.100	.625	.251	.876	.502	.753
	27½	.100	.625	.250	.875	.500	.750
	30	2.099	2.624	5.248	7.872	10.497	15.745
	32½	.099	.623	.247	.870	.493	.740
	33¾	.098	.623	.246	.869	.491	.737
	35	.098	.622	.245	.867	.490	.735
	37½	.097	.622	.243	.865	.486	.729
	40	2.097	2.621	5.241	7.862	10.483	15.724
	41¼	.096	.620	.241	.861	.481	.722
	42½	.096	.620	.240	.859	.479	.719
	45	.095	.619	.238	.857	.476	.714
	47½	.095	.618	.236	.854	.472	.708
	48¾	.094	.618	.235	.853	.471	.706
	50	2.094	2.617	5.234	7.852	10.469	15.703
	52½	.093	.616	.233	.849	.465	.690
	55	.092	.615	.231	.846	.462	.693
	56¼	.092	.615	.230	.845	.460	.690
	57½	.092	.615	.229	.844	.458	.687
25	00	2.091	2.614	5.227	7.841	10.455	15.682
	02½	.090	.613	.226	.838	.451	.677
	03¾	.090	.612	.225	.837	.449	.674
	05	.090	.612	.224	.836	.448	.672
	07½	.089	.611	.222	.833	.444	.666
	10	2.088	2.610	5.220	7.830	10.441	15.661
	11¼	.088	.610	.219	.829	.439	.658
	12½	.087	.609	.219	.828	.437	.656
	15	.087	.608	.217	.825	.433	.650
	17½	.086	.608	.215	.822	.430	.645
	18¾	.086	.607	.214	.821	.428	.642
	20	2.085	2.607	5.213	7.820	10.426	15.640
	22½	.085	.606	.211	.817	.423	.634
	25	.084	.605	.210	.814	.419	.629
	26¼	.083	.604	.209	.813	.417	.626
	27½	.083	.604	.208	.812	.416	.623
	30	2.082	2.603	5.206	7.809	10.412	15.618
	32½	.082	.602	.204	.806	.408	.613
	33¾	.081	.602	.203	.805	.407	.610
	35	.081	.601	.202	.804	.405	.607
	37½	.080	.600	.201	.801	.401	.602
	40	2.079	2.599	5.199	7.798	10.398	15.596
	41¼	.079	.599	.198	.797	.396	.594
	42½	.079	.598	.197	.795	.394	.591
	45	.078	.598	.195	.793	.390	.585
	47½	.077	.597	.193	.790	.387	.580
	48¾	.077	.596	.192	.789	.385	.577
	50	2.077	2.596	5.192	7.787	10.383	15.575
	52½	.076	.595	.190	.785	.379	.569
	55	.075	.594	.188	.782	.376	.564
	56¼	.075	.593	.187	.781	.374	.561
	57½	.074	.593	.186	.779	.372	.558
26	00	2.074	2.592	5.184	7.776	10.369	15.553

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 24°	1¼	2.867	0.000
	2½	5.735	.001
	3¾	8.602	.002
	5	11.470	.003
	6¼	14.338	.005
	7½	17.205	.007
	10	22.940	.012
	12½	28.675	.019
	15	34.410	.028
For latitude 25°	1¼	2.868	0.000
	2½	5.736	.001
	3¾	8.604	.002
	5	11.471	.003
	6¼	14.340	.005
	7½	17.207	.007
	10	22.943	.013
	12½	28.679	.020
	15	34.415	.029
For latitude 26°	1¼	2.868	0.000
	2½	5.736	.001
	3¾	8.605	.002
	5	11.473	.003
	6¼	14.342	.005
	7½	17.210	.007
	10	22.946	.013
	12½	28.683	.021
	15	34.419	.030

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
26 00	2.074	2.592	5.184	7.776	10.369	15.553
02½	.073	.591	.182	.774	.365	.547
03¾	.073	.591	.182	.772	.363	.545
05	.072	.590	.181	.771	.361	.542
07½	.072	.589	.179	.768	.358	.536
10	2.071	2.588	5.177	7.765	10.354	15.531
11¼	.070	.588	.176	.764	.352	.528
12½	.070	.588	.175	.763	.350	.525
15	.069	.587	.173	.760	.346	.520
17½	.069	.586	.171	.757	.343	.514
18¾	.068	.585	.170	.756	.341	.511
20	2.068	2.585	5.170	7.754	10.339	15.509
22½	.067	.584	.168	.752	.335	.503
25	.066	.583	.166	.749	.332	.498
26¼	.066	.582	.165	.747	.330	.495
27½	.066	.582	.164	.746	.328	.492
30	2.065	2.581	5.162	7.743	10.324	15.486
32½	.064	.580	.160	.740	.321	.481
33¾	.064	.580	.159	.739	.319	.478
35	.063	.579	.158	.738	.317	.475
37½	.063	.578	.157	.735	.313	.470
40	2.062	2.577	5.155	7.732	10.309	15.464
41¼	.061	.577	.154	.731	.307	.461
42½	.061	.576	.153	.729	.306	.458
45	.060	.575	.151	.726	.302	.453
47½	.060	.575	.149	.724	.298	.447
48¾	.059	.574	.148	.722	.296	.444
50	2.059	2.574	5.147	7.721	10.294	15.441
52½	.058	.573	.145	.718	.291	.436
55	.058	.572	.143	.715	.287	.430
56¼	.057	.571	.142	.714	.285	.427
57½	.057	.571	.141	.712	.283	.424
27 00	2.056	2.570	5.140	7.709	10.279	15.419
02½	.055	.569	.138	.707	.275	.413
03¾	.055	.568	.137	.705	.274	.410
05	.054	.568	.136	.704	.272	.407
07½	.054	.567	.134	.701	.268	.402
10	2.053	2.566	5.132	7.698	10.264	15.396
11¼	.052	.566	.131	.697	.262	.393
12½	.052	.565	.130	.695	.260	.390
15	.051	.564	.128	.692	.256	.385
17½	.051	.563	.126	.689	.253	.379
18¾	.050	.563	.125	.688	.251	.376
20	2.050	2.562	5.124	7.687	10.249	15.373
22½	.049	.561	.122	.684	.245	.367
25	.048	.560	.121	.681	.241	.362
26¼	.048	.560	.120	.679	.239	.359
27½	.047	.559	.119	.678	.237	.356
30	2.047	2.558	5.117	7.675	10.233	15.350
32½	.046	.557	.115	.672	.229	.344
33¾	.046	.557	.114	.671	.228	.341
35	.045	.556	.113	.669	.226	.338
37½	.044	.555	.111	.666	.222	.333
40	2.044	2.554	5.109	7.663	10.218	15.327
41¼	.043	.554	.108	.662	.216	.324
42½	.043	.553	.107	.660	.214	.321
45	.042	.553	.105	.658	.210	.315
47½	.041	.552	.103	.655	.206	.309
48¾	.041	.551	.102	.653	.204	.306
50	2.041	2.551	5.101	7.652	10.202	15.304
52½	.040	.550	.100	.649	.198	.298
55	.039	.549	.097	.646	.195	.292
56¼	.039	.548	.096	.644	.193	.289
57½	.038	.548	.095	.643	.191	.286
28 00	2.037	2.547	5.093	7.640	10.187	15.280

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 26°	1¼	2.868	0.000
	2½	5.736	.001
	3¾	8.605	.002
	5	11.473	.003
	6¼	14.342	.005
	7½	17.210	.007
	10	22.946	.013
	12½	28.683	.021
	15	34.419	.030
For latitude 27°	1¼	2.869	0.000
	2½	5.737	.001
	3¾	8.606	.002
	5	11.475	.003
	6¼	14.344	.005
	7½	17.212	.008
	10	22.949	.014
	12½	28.687	.021
	15	34.424	.031
For latitude 28°	1¼	2.869	0.000
	2½	5.738	.001
	3¾	8.607	.002
	5	11.476	.003
	6¼	14.346	.005
	7½	17.215	.008
	10	22.953	.014
	12½	28.691	.022
	15	34.429	.031

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
28 00	2. 037	2. 547	5. 093	7. 640	10. 187	15. 280
02½	. 037	. 546	. 091	. 637	. 183	. 274
03¾	. 036	. 545	. 090	. 636	. 181	. 271
05	. 036	. 545	. 089	. 634	. 179	. 268
07½	. 035	. 544	. 088	. 631	. 175	. 262
10	2. 034	2. 543	5. 085	7. 628	10. 171	15. 256
11¼	. 034	. 542	. 085	. 627	. 169	. 254
12½	. 033	. 542	. 084	. 625	. 167	. 251
15	. 033	. 541	. 082	. 622	. 163	. 245
17½	. 032	. 540	. 080	. 619	. 159	. 239
18¾	. 031	. 539	. 079	. 618	. 157	. 236
20	2. 031	2. 539	5. 078	7. 616	10. 155	15. 233
22½	. 030	. 538	. 076	. 613	. 151	. 227
25	. 029	. 537	. 074	. 610	. 147	. 221
26¼	. 029	. 536	. 073	. 609	. 145	. 218
27½	. 029	. 536	. 072	. 607	. 143	. 215
30	2. 028	2. 535	5. 070	7. 604	10. 139	15. 209
32½	. 027	. 534	. 068	. 601	. 135	. 203
33¾	. 027	. 533	. 067	. 600	. 133	. 200
35	. 026	. 533	. 066	. 598	. 131	. 197
37½	. 025	. 532	. 064	. 596	. 127	. 191
40	2. 025	2. 531	5. 062	7. 593	10. 123	15. 185
41¼	. 024	. 530	. 061	. 591	. 121	. 182
42½	. 024	. 530	. 060	. 590	. 119	. 179
45	. 023	. 529	. 058	. 586	. 115	. 173
47½	. 022	. 528	. 056	. 583	. 111	. 167
48¾	. 022	. 527	. 055	. 582	. 109	. 164
50	2. 021	2. 527	5. 054	7. 580	10. 107	15. 161
52½	. 021	. 526	. 052	. 577	. 103	. 155
55	. 020	. 525	. 050	. 574	. 099	. 149
56¼	. 019	. 524	. 049	. 573	. 097	. 146
57½	. 019	. 524	. 048	. 571	. 095	. 143
29 00	2. 018	2. 523	5. 046	7. 568	10. 091	15. 137
02½	. 017	. 522	. 044	. 565	. 087	. 131
03¾	. 017	. 521	. 043	. 564	. 085	. 127
05	. 017	. 521	. 042	. 562	. 083	. 125
07½	. 016	. 520	. 039	. 559	. 079	. 118
10	2. 015	2. 519	5. 037	7. 556	10. 075	15. 112
11¼	. 015	. 518	. 036	. 555	. 073	. 109
12½	. 014	. 518	. 035	. 553	. 071	. 106
15	. 013	. 517	. 033	. 550	. 067	. 100
17½	. 012	. 516	. 031	. 547	. 063	. 094
18¾	. 012	. 515	. 030	. 545	. 061	. 091
20	2. 012	2. 515	5. 029	7. 544	10. 059	15. 088
22½	. 011	. 514	. 027	. 541	. 055	. 082
25	. 010	. 513	. 025	. 538	. 050	. 076
26¼	. 010	. 512	. 024	. 536	. 048	. 073
27½	. 009	. 512	. 023	. 535	. 046	. 069
30	2. 008	2. 511	5. 021	7. 532	10. 042	15. 063
32½	. 008	. 509	. 019	. 529	. 038	. 057
33¾	. 007	. 509	. 018	. 527	. 036	. 054
35	. 007	. 508	. 017	. 525	. 034	. 051
37½	. 006	. 507	. 015	. 522	. 030	. 045
40	2. 005	2. 506	5. 013	7. 519	10. 026	15. 039
41¼	. 005	. 506	. 012	. 518	. 024	. 035
42½	. 004	. 505	. 011	. 516	. 022	. 032
45	. 003	. 504	. 009	. 513	. 017	. 026
47½	. 003	. 503	. 007	. 510	. 013	. 020
48¾	. 002	. 503	. 006	. 508	. 011	. 017
50	2. 002	2. 502	5. 005	7. 507	10. 009	15. 014
52½	. 001	. 501	. 003	. 504	. 005	. 007
55	. 000	. 500	. 000	. 501	. 001	. 001
56¼	. 000	. 500	4. 999	. 499	9. 999	14. 998
57½	1. 999	. 499	. 998	. 497	. 997	. 995
30 00	1. 998	2. 498	4. 996	7. 494	9. 992	14. 989

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 28°	1¼	2. 869	0. 000
	2½	5. 738	. 001
	3¾	8. 607	. 002
	5	11. 476	. 003
	6¼	14. 346	. 005
	7½	17. 215	. 008
	10	22. 953	. 014
	12½	28. 691	. 022
	15	34. 429	. 031
For latitude 29°	1¼	2. 869	0. 000
	2½	5. 739	. 001
	3¾	8. 609	. 002
	5	11. 478	. 004
	6¼	14. 348	. 006
	7½	17. 217	. 008
	10	22. 956	. 014
	12½	28. 696	. 022
	15	34. 434	. 032
For latitude 30°	1¼	2. 870	0. 000
	2½	5. 740	. 001
	3¾	8. 611	. 002
	5	11. 480	. 004
	6¼	14. 350	. 006
	7½	17. 220	. 008
	10	22. 960	. 015
	12½	28. 700	. 023
	15	34. 440	. 033

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
30 00	1.998	2.498	4.996	7.494	9.992	14.989
02½	.998	.497	.994	.491	.988	.982
03¾	.997	.497	.993	.490	.986	.979
05	.997	.496	.992	.488	.984	.976
07½	.996	.495	.990	.485	.980	.970
10	1.995	2.494	4.988	7.482	9.976	14.964
11¼	.995	.493	.987	.480	.974	.960
12½	.994	.493	.986	.479	.971	.957
15	.993	.492	.984	.476	.967	.951
17½	.993	.491	.982	.472	.963	.945
18¾	.992	.490	.981	.471	.961	.942
20	1.992	2.490	4.979	7.469	9.959	14.938
22½	.991	.489	.977	.466	.955	.932
25	.990	.488	.975	.463	.950	.926
26¼	.990	.487	.974	.461	.948	.923
27½	.989	.487	.973	.460	.946	.919
30	1.988	2.486	4.971	7.457	9.942	14.913
32½	.988	.484	.969	.453	.938	.907
33¾	.987	.484	.968	.452	.936	.903
35	.987	.483	.967	.450	.934	.900
37½	.986	.482	.965	.447	.929	.894
40	1.985	2.481	4.963	7.444	9.925	14.888
41¼	.985	.481	.961	.442	.923	.884
42½	.984	.480	.960	.441	.921	.881
45	.983	.479	.958	.437	.916	.875
47½	.982	.478	.956	.434	.912	.868
48¾	.982	.478	.955	.433	.910	.865
50	1.982	2.477	4.954	7.431	9.908	14.862
52½	.981	.476	.952	.428	.904	.856
55	.980	.475	.950	.425	.899	.849
56¼	.979	.474	.949	.423	.897	.846
57½	.979	.474	.948	.421	.895	.843
31 00	1.978	2.473	4.945	7.418	9.891	14.836
02½	.977	.472	.943	.415	.886	.830
03¾	.977	.471	.942	.413	.884	.827
05	.976	.471	.941	.412	.882	.823
07½	.976	.469	.939	.408	.878	.817
10	1.975	2.468	4.937	7.405	9.874	14.810
11¼	.974	.468	.936	.403	.871	.807
12½	.974	.467	.935	.402	.869	.804
15	.973	.466	.932	.399	.865	.797
17½	.972	.465	.930	.395	.861	.791
18¾	.972	.465	.929	.394	.858	.787
20	1.971	2.464	4.928	7.392	9.856	14.784
22½	.970	.463	.926	.389	.852	.778
25	.969	.462	.924	.386	.848	.771
26¼	.969	.461	.923	.384	.845	.768
27½	.969	.461	.921	.382	.843	.765
30	1.968	2.460	4.919	7.379	9.839	14.758
32½	.967	.459	.917	.376	.834	.752
33¾	.967	.458	.916	.374	.832	.748
35	.966	.458	.915	.373	.830	.745
37½	.965	.456	.913	.369	.826	.739
40	1.964	2.455	4.911	7.366	9.821	14.732
41¼	.964	.455	.910	.364	.819	.729
42½	.963	.454	.908	.363	.817	.725
45	.963	.453	.906	.359	.813	.719
47½	.962	.452	.904	.356	.808	.712
48¾	.961	.451	.903	.354	.806	.709
50	1.961	2.451	4.902	7.353	9.804	14.706
52½	.960	.450	.900	.349	.799	.699
55	.959	.449	.897	.346	.795	.692
56¼	.959	.448	.896	.345	.793	.689
57½	.958	.448	.895	.343	.790	.686
32 00	1.957	2.447	4.893	7.340	9.786	14.679

Ordinates of developed parallel and meridional distances

Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 30°	1¼	2.870	0.000
	2½	5.740	.001
	3¾	8.611	.002
	5	11.480	.004
	6¼	14.350	.006
	7½	17.220	.008
	10	22.960	.015
	12½	28.700	.023
	15	34.440	.033
For latitude 31°	1¼	2.870	0.000
	2½	5.741	.001
	3¾	8.611	.002
	5	11.482	.004
	6¼	14.352	.006
	7½	17.223	.008
	10	22.963	.015
	12½	28.704	.023
	15	34.445	.033
For latitude 32°	1¼	2.871	0.000
	2½	5.742	.001
	3¾	8.613	.002
	5	11.483	.004
	6¼	14.355	.006
	7½	17.225	.008
	10	22.967	.015
	12½	28.709	.024
	15	34.450	.034

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$—Continued

Latitude of parallel		Abscissas of developed parallel					
		Longitude interval					
		1′	1¼′	2½′	3¾′	5′	7½′
°	′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
32	00	1.957	2.447	4.893	7.340	9.786	14.679
	02½	.956	.445	.891	.336	.782	.672
	03¾	.956	.445	.890	.335	.779	.669
	05	.955	.444	.889	.333	.777	.666
	07½	.955	.443	.886	.330	.773	.659
	10	1.954	2.442	4.884	7.326	9.768	44.652
	11¼	.953	.441	.883	.325	.766	.649
	12½	.953	.441	.882	.323	.764	.646
	15	.952	.440	.880	.320	.759	.639
	17½	.951	.439	.877	.316	.755	.632
	18¾	.951	.438	.876	.315	.753	.629
	20	1.950	2.438	4.875	7.313	9.751	14.626
	22½	.949	.437	.873	.310	.746	.619
	25	.948	.435	.871	.306	.742	.612
	26¼	.948	.435	.870	.305	.739	.609
	27½	.947	.434	.869	.303	.737	.606
	30	1.947	2.433	4.866	7.299	9.733	14.599
	32½	.946	.432	.864	.295	.728	.592
	33¾	.945	.431	.863	.294	.726	.589
	35	.945	.431	.862	.293	.724	.585
	37½	.944	.430	.860	.289	.719	.579
	40	1.943	2.429	4.857	7.286	9.715	14.572
	41¼	.942	.428	.856	.284	.712	.569
	42½	.942	.428	.855	.283	.710	.565
	45	.941	.426	.853	.279	.706	.558
	47½	.940	.425	.851	.276	.701	.551
	48¾	.940	.425	.849	.274	.699	.548
	50	1.939	2.424	4.848	7.272	9.697	14.545
	52½	.938	.423	.846	.269	.692	.538
	55	.937	.422	.844	.266	.687	.531
	56¼	.937	.421	.843	.264	.685	.528
	57½	.937	.421	.841	.262	.683	.524
33	00	1.936	2.420	4.839	7.259	9.678	14.518
	02½	.935	.418	.837	.255	.674	.511
	03¾	.934	.418	.836	.254	.671	.507
	05	.934	.417	.835	.252	.669	.504
	07½	.933	.416	.832	.249	.665	.497
	10	1.932	2.415	4.830	7.245	9.660	14.490
	11¼	.932	.415	.829	.243	.658	.487
	12½	.931	.414	.828	.242	.656	.483
	15	.930	.413	.825	.238	.651	.476
	17½	.929	.412	.823	.235	.646	.470
	18¾	.929	.411	.822	.233	.644	.466
	20	1.928	2.410	4.821	7.231	9.642	14.463
	22½	.927	.409	.819	.228	.637	.456
	25	.926	.408	.816	.224	.633	.449
	26¼	.926	.408	.815	.223	.630	.445
	27½	.926	.407	.814	.221	.628	.442
	30	1.925	2.406	4.812	7.218	9.623	14.435
	32½	.924	.405	.809	.214	.619	.428
	33¾	.923	.404	.808	.212	.617	.425
	35	.923	.404	.807	.211	.614	.421
	37½	.922	.402	.805	.207	.610	.414
	40	1.921	2.401	4.802	7.204	9.605	14.407
	41¼	.921	.401	.801	.202	.603	.404
	42½	.920	.400	.800	.200	.600	.400
	45	.919	.399	.798	.197	.596	.394
	47½	.918	.398	.795	.193	.591	.387
	48¾	.918	.397	.794	.191	.589	.383
	50	1.917	2.397	4.793	7.190	9.586	14.380
	52½	.916	.395	.791	.186	.582	.373
	55	.915	.394	.789	.183	.577	.366
	56¼	.915	.394	.787	.181	.575	.362
	57½	.915	.393	.786	.179	.572	.358
34	00	1.914	2.392	4.784	7.176	9.568	14.352

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 32°	1¼	2.871	0.000
	2½	5.742	.001
	3¾	8.613	.002
	5	11.483	.004
	6¼	14.355	.006
	7½	17.225	.008
	10	22.967	.015
	12½	28.709	.024
	15	34.450	.034
For latitude 33°	1¼	2.871	0.000
	2½	5.743	.001
	3¾	8.614	.002
	5	11.485	.004
	6¼	14.357	.006
	7½	17.228	.009
	10	22.971	.015
	12½	28.714	.024
	15	34.456	.035
For latitude 34°	1¼	2.872	0.000
	2½	5.744	.001
	3¾	8.615	.002
	5	11.487	.004
	6¼	14.359	.006
	7½	17.231	.009
	10	22.974	.016
	12½	28.718	.024
	15	34.462	.035

TABLE 3.—*Coordinates for the projection of maps, scale $\frac{1}{31680}$*—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval: 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
34 00	1.914	2.392	4.784	7.176	9.568	14.352
02½	.913	.391	.782	.172	.563	.345
03¾	.912	.390	.780	.171	.561	.341
05	.912	.390	.779	.169	.558	.338
07½	.911	.388	.777	.165	.554	.331
10	1.910	2.387	4.775	7.162	9.549	14.324
11¼	.909	.387	.773	.160	.547	.320
12½	.909	.386	.772	.158	.544	.316
15	.908	.385	.770	.155	.540	.309
17½	.907	.384	.767	.151	.535	.302
18¾	.906	.383	.766	.149	.533	.299
20	1.906	2.383	4.765	7.148	9.530	14.295
22½	.905	.381	.763	.144	.525	.288
25	.904	.380	.760	.141	.521	.281
26¼	.904	.380	.759	.139	.518	.278
27½	.903	.379	.758	.137	.516	.273
30	1.902	2.378	4.756	7.133	9.511	14.267
32½	.901	.377	.753	.130	.507	.260
33¾	.901	.376	.752	.128	.504	.256
35	.900	.375	.751	.126	.502	.253
37½	.899	.374	.749	.123	.497	.246
40	1.898	2.373	4.746	7.119	9.492	14.239
41¼	.898	.373	.745	.117	.490	.235
42½	.897	.372	.744	.116	.488	.231
45	.897	.371	.741	.112	.483	.224
47½	.896	.370	.739	.109	.478	.217
48¾	.895	.369	.738	.107	.476	.213
50	1.895	2.368	4.737	7.105	9.473	14.210
52½	.894	.367	.734	.101	.468	.203
55	.893	.366	.732	.098	.464	.196
56¼	.892	.365	.731	.095	.461	.192
57½	.892	.365	.729	.094	.459	.188
35 00	1.891	2.364	4.727	7.091	9.454	14.181
02½	.890	.362	.725	.087	.449	.174
03¾	.889	.362	.724	.085	.447	.170
05	.889	.361	.722	.083	.445	.167
07½	.888	.360	.720	.079	.439	.160
10	1.887	2.359	4.717	7.076	9.435	14.152
11¼	.886	.358	.716	.074	.433	.149
12½	.886	.357	.715	.073	.430	.145
15	.885	.356	.713	.069	.425	.138
17½	.884	.355	.710	.065	.420	.131
18¾	.884	.354	.709	.064	.418	.127
20	1.883	2.354	4.708	7.062	9.416	14.124
22½	.882	.353	.705	.058	.411	.116
25	.881	.352	.703	.054	.406	.109
26¼	.881	.351	.702	.053	.404	.105
27½	.880	.350	.701	.051	.401	.102
30	1.879	2.349	4.698	7.047	9.396	14.094
32½	.878	.348	.696	.044	.391	.087
33¾	.878	.347	.694	.042	.389	.083
35	.877	.347	.693	.040	.387	.080
37½	.876	.345	.691	.036	.382	.073
40	1.875	2.344	4.688	7.033	9.377	14.065
41¼	.875	.344	.687	.031	.374	.062
42½	.874	.343	.686	.029	.372	.058
45	.873	.342	.684	.025	.367	.051
47½	.872	.341	.681	.022	.362	.043
48¾	.872	.340	.680	.020	.360	.040
50	1.871	2.339	4.679	7.018	9.357	14.036
52½	.870	.338	.676	.014	.352	.029
55	.869	.337	.674	.011	.348	.021
56¼	.869	.336	.673	.009	.345	.018
57½	.869	.336	.671	.007	.343	.014
36 00	1.868	2.334	4.669	7.003	9.338	14.007

Ordinates of developed parallel and meridional distances

Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 34°	1¼	2.872	0.000
	2½	5.744	.001
	3¾	8.615	.002
	5	11.487	.004
	6¼	14.359	.006
	7½	17.231	.009
	10	22.974	.016
	12½	28.718	.024
	15	34.462	.035
For latitude 35°	1¼	2.872	0.000
	2½	5.745	.001
	3¾	8.617	.002
	5	11.489	.004
	6¼	14.362	.006
	7½	17.234	.009
	10	22.978	.016
	12½	28.723	.025
	15	34.467	.036
For latitude 36°	1¼	2.873	0.000
	2½	5.745	.001
	3¾	8.618	.002
	5	11.491	.004
	6¼	14.364	.006
	7½	17.237	.009
	10	22.982	.016
	12½	28.728	.025
	15	34.473	.036

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$—Continued

Latitude of parallel		Abscissas of developed parallel					
		Longitude interval					
		1′	1¼′	2½′	3¾′	5′	7½′
°	′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
36	00	1.868	2.334	4.669	7.003	9.338	14.007
	02½	.867	.333	.666	.000	.333	13.999
	03¾	.866	.333	.665	6.998	.330	.996
	05	.866	.332	.664	.996	.328	.992
	07½	.865	.331	.661	.992	.323	.984
	10	1.864	2.330	4.659	6.989	9.318	13.977
	11¼	.863	.329	.658	.987	.316	.973
	12½	.863	.328	.657	.985	.313	.970
	15	.862	.327	.654	.981	.308	.962
	17½	.861	.326	652	.977	.303	.955
	18¾	.860	.325	.650	.976	.301	.951
	20	1.860	2.325	4.649	6.974	9.298	13.947
	22½	.859	.323	.647	.970	.293	.940
	25	.858	.322	.644	.966	.288	.933
	26¼	.857	.321	.643	.964	.286	.929
	27½	.857	.321	.642	.963	.283	.925
	30	1.856	2.320	4.639	6.959	9.278	13.918
	32½	.855	.318	.637	.955	.273	.910
	33¾	.854	.318	.635	.953	.271	.906
	35	.854	.317	.634	.951	.268	.903
	37½	.853	.316	.632	.948	.264	.895
	40	1.852	2.315	4.629	6.944	9.259	13.888
	41¼	.851	.314	.628	.942	.256	.884
	42½	.851	.313	.627	.940	.254	.880
	45	.850	.312	.624	.936	.249	.873
	47½	.849	.311	.622	.933	.243	.865
	48¾	.848	.310	.621	.931	.241	.862
	50	1.848	2.310	4.619	6.929	9.238	13.858
	52½	.847	.308	.617	.925	.233	.850
	55	.846	.307	.614	.921	.228	.843
	56¼	.845	.306	.613	.919	.226	.839
	57½	.845	.306	.612	.918	.223	.835
37	00	1.844	2.305	4.609	6.914	9.218	13.828
	02½	.843	.303	.607	.910	.213	.820
	03¾	.842	.303	.605	.908	.211	.816
	05	.842	.302	.604	.906	.208	.813
	07½	.841	.301	.602	.902	.203	.805
	10	1.840	2.300	4.599	6.899	9.198	13.797
	11¼	.839	.299	.598	.897	.196	.794
	12½	.839	.298	.597	.895	.193	.790
	15	.838	.297	.594	.891	.188	.782
	17½	.837	.296	.592	.887	.183	.775
	18¾	.836	.295	.590	.885	.181	.771
	20	1.836	2.295	4.589	6.884	9.178	13.767
	22½	.835	.293	.587	.880	.173	.759
	25	.834	.292	.584	.876	.168	.752
	26¼	.833	.291	.583	.874	.165	.748
	27½	.833	.291	.581	.872	.163	.744
	30	1.832	2.289	4.579	6.868	9.158	13.737
	32½	.831	.288	.576	.864	.153	.729
	33¾	.830	.288	.575	.863	.150	.725
	35	.830	.287	.574	.861	.148	.721
	37½	.829	.286	.571	.857	.142	.714
	40	1.827	2.284	4.569	6.853	9.137	13.706
	41¼	.827	.284	.567	.851	.135	.702
	42½	.826	.283	.566	.849	.132	.698
	45	.825	.282	.564	.845	.127	.691
	47½	.824	.280	.561	841	.122	.683
	48¾	.824	.280	.560	.840	.119	.679
	50	1.823	2.279	4.558	6.838	9.117	13.675
	52½	.822	.278	.556	.834	.112	.668
	55	.821	.277	.553	.830	.107	.660
	56¼	.821	.276	.552	.828	.104	.656
	57½	.820	.275	.551	.826	.101	.652
38	00	1.819	2.274	4.548	6.822	9.096	13.644

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 36°	1¼	2.873	0.000
	2½	5.745	.001
	3¾	8.618	.002
	5	11.491	.004
	6¼	14.364	.006
	7½	17.237	.009
	10	22.982	.016
	12½	28.728	.025
	15	34.473	.036
For latitude 37°	1¼	2.873	0.000
	2½	5.746	.001
	3¾	8.620	.002
	5	11.493	.004
	6¼	14.366	.006
	7½	17.240	.009
	10	22.986	.016
	12½	28.733	.025
	15	34.479	.036
For latitude 38°	1¼	2.874	0.000
	2½	5.747	.001
	3¾	8.621	.002
	5	11.495	.004
	6¼	14.369	.006
	7½	17.242	.009
	10	22.990	.016
	12½	28.738	.025
	15	34.485	.037

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$—Continued

Latitude of parallel		Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
°	′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
38	00	1.819	2.274	4.548	6.822	9.096	13.644
	02½	.818	.273	.546	.818	.091	.636
	03¾	.818	.272	.544	.816	.089	.633
	05	.817	.272	.543	.814	.086	.629
	07½	.816	.270	.540	.811	.081	.621
	10	1.815	2.269	4.538	6.807	9.076	13.614
	11¼	.815	.268	.537	.805	.073	.610
	12½	.814	.268	.535	.803	.071	.606
	15	.813	.266	.533	.799	.065	.598
	17½	.812	.265	.530	.795	.060	.590
	18¾	.812	.264	.529	.793	.058	.586
	20	1.811	2.264	4.527	6.791	9.055	13.582
	22½	.810	.262	.525	.787	.050	.575
	25	.809	.261	.522	.783	.045	.567
	26¼	.808	.260	.521	.781	.042	.563
	27½	.808	.260	.520	.780	.039	.559
	30	1.807	2.259	4.517	6.776	9.034	13.551
	32½	.806	.257	.515	.772	.029	.544
	33¾	.805	.257	.513	.770	.026	.540
	35	.805	.256	.512	.768	.024	.536
	37½	.804	.255	.509	.764	.019	.528
	40	1.803	2.253	4.507	6.760	9.013	13.520
	41¼	.802	.253	.505	.758	.011	.516
	42½	.802	.252	.504	.756	.008	.513
	45	.801	.251	.501	.752	.003	.504
	47½	.800	.249	.499	.748	8.998	.497
	48¾	.799	.249	.498	.746	.995	.493
	50	1.798	2.248	4.496	6.744	8.992	13.489
	52½	.797	.247	.494	.740	.987	.481
	55	.796	.245	.491	.736	.982	.473
	56¼	.796	.245	.490	.734	.979	.469
	57½	.795	.244	.488	.732	.977	.465
39	00	1.794	2.243	4.486	6.729	8.971	13.457
	02½	.793	.242	.483	.725	.966	.449
	03¾	.793	.241	.482	.723	.964	.445
	05	.792	.240	.480	.721	.961	.441
	07½	.791	.239	.478	.717	.956	.433
	10	1.790	2.238	4.475	6.713	8.950	13.425
	11¼	.790	.237	.474	.711	.948	.422
	12½	.789	.236	.473	.709	.945	.418
	15	.788	.235	.470	.705	.940	.410
	17½	.787	.234	.467	.701	.934	.402
	18¾	.786	.233	.466	.699	.932	.398
	20	1.786	2.232	4.465	6.697	8.929	13.394
	22½	.785	.231	.462	.693	.924	.386
	25	.784	.230	.459	.689	.919	.378
	26¼	.783	.229	.458	.687	.916	.374
	27½	.783	.228	.457	.685	.913	.370
	30	1.782	2.227	4.454	6.681	8.908	13.362
	32½	.781	.226	.451	.677	.903	.354
	33¾	.780	.225	.450	.675	.900	.350
	35	.779	.224	.449	.673	.897	.346
	37½	.778	.223	.446	.669	.892	.338
	40	1.777	2.222	4.443	6.665	8.887	13.330
	41¼	.777	.221	.442	.663	.884	.326
	42½	.776	.220	.441	.661	.881	.322
	45	.775	.219	.438	.657	.876	.314
	47½	.774	.218	.435	.653	.871	.306
	48¾	.774	.217	.434	.651	.868	.302
	50	1.773	2.216	4.433	6.649	8.865	13.298
	52½	.772	.215	.430	.645	.860	.290
	55	.771	.214	.427	.641	.855	.282
	56¼	.770	.213	.426	.639	.852	.278
	57½	.770	.212	.425	.637	.849	.274
40	00	1.769	2.211	4.422	6.633	8.844	13.266

Ordinates of developed parallel and meridional distances

Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 38°	1¼	2.874	0.000
	2½	5.747	.001
	3¾	8.621	.002
	5	11.495	.004
	6¼	14.369	.006
	7½	17.242	.009
	10	22.990	.016
	12½	28.738	.025
	15	34.485	.037
For latitude 39°	1¼	2.874	0.000
	2½	5.748	.001
	3¾	8.623	.002
	5	11.497	.004
	6¼	14.371	.006
	7½	17.245	.009
	10	22.994	.016
	12½	28.743	.026
	15	34.491	.037
For latitude 40°	1¼	2.875	0.000
	2½	5.749	.001
	3¾	8.624	.002
	5	11.499	.004
	6¼	14.374	.006
	7½	17.248	.009
	10	22.998	.017
	12½	28.748	.026
	15	34.497	.037

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$—Continued

Latitude of parallel		Abscissas of developed parallel					
		Longitude interval					
		1′	1¼′	2½′	3¾′	5′	7½′
°	′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
40	00	1.769	2.211	4.422	6.633	8.844	13.266
	02½	.768	.210	.419	.629	.838	.258
	03¾	.767	.209	.418	.627	.836	.254
	05	.767	.208	.416	.625	.833	.250
	07½	.765	.207	.414	.621	.828	.241
	10	1.764	2.206	4.411	6.617	8.822	13.233
	11¼	.764	.205	.410	.615	.819	.229
	12½	.763	.204	.408	.612	.817	.224
	15	.762	.203	.406	.609	.811	.217
	17½	.761	.202	.403	.605	.806	.209
	18¾	.761	.201	.402	.602	.803	.205
	20	1.760	2.200	4.400	6.600	8.801	13.201
	22½	.759	.199	.398	.596	.795	.193
	25	.758	.197	.395	.592	.790	.185
	26¼	.757	.197	.394	.590	.787	.181
	27½	.757	.196	.392	.588	.784	.177
	30	1.756	2.195	4.389	6.584	8.779	13.168
	32½	.755	.193	.387	.580	.773	.160
	33¾	.754	.193	.385	.578	.771	.156
	35	.754	.192	.384	.576	.768	.152
	37½	.753	.191	.381	.572	.763	.144
	40	1.751	2.189	4.379	6.568	8.757	13.136
	41¼	.751	.189	.377	.566	.754	.132
	42½	.750	.188	.376	.564	.752	.128
	45	.749	.186	.373	.560	.746	.119
	47½	.748	.185	.370	.556	.741	.111
	48¾	.748	.184	.369	.554	.738	.107
	50	1.747	2.184	4.368	6.551	8.735	13.103
	52½	.746	.182	.365	.547	.730	.095
	55	.745	.181	.362	.543	.724	.087
	56¼	.744	.180	.361	.541	.722	.083
	57½	.744	.180	.360	.539	.719	.078
41	00	1.743	2.178	4.357	6.535	8.713	13.070
	02½	.742	.177	.354	.531	.708	.062
	03¾	.741	.176	.353	.529	.705	.058
	05	.740	.176	.351	.527	.702	.054
	07½	.739	.174	.348	.523	.697	.045
	10	1.738	2.173	4.346	6.519	8.691	13.037
	11¼	.738	.172	.344	.517	.689	.033
	12½	.737	.171	.343	.514	.686	.029
	15	.736	.170	.340	.510	.680	.021
	17½	.735	.169	.337	.506	.675	.012
	18¾	.734	.168	.336	.504	.672	.008
	20	1.734	2.167	4.335	6.502	8.669	13.004
	22½	.733	.166	.332	.498	.664	12.996
	25	.732	.165	.329	.494	.658	.987
	26¼	.731	.164	.328	.492	.656	.983
	27½	.731	.163	.326	.490	.653	.979
	30	1.729	2.162	4.324	6.485	8.647	12.971
	32½	.728	.160	.321	.481	.642	.963
	33¾	.728	.160	.319	.479	.639	.958
	35	.727	.159	.318	.477	.636	.954
	37½	.726	.158	.315	.473	.631	.946
	40	1.725	2.156	4.313	6.469	8.625	12.938
	41¼	.724	.156	.311	.467	.622	.933
	42½	.724	.155	.310	.465	.619	.929
	45	.723	.153	.307	.460	.614	.921
	47½	.722	.152	.304	.456	.608	.913
	48¾	.721	.151	.303	.454	.606	.908
	50	1.721	2.151	4.301	6.452	8.603	12.904
	52½	.719	.149	.297	.448	.597	.896
	55	.718	.148	.296	.444	.592	.887
	56¼	.718	.147	.294	.442	.589	.883
	57½	.717	.146	.293	.439	.586	.879
42	00	1.716	2.145	4.290	6.435	8.580	12.871

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 40°	1¼	2.875	0.000
	2½	5.749	.001
	3¾	8.624	.002
	5	11.499	.004
	6¼	14.374	.006
	7½	17.248	.009
	10	22.998	.017
	12½	28.748	.026
	15	34.497	.037
For latitude 41°	1¼	2.875	0.000
	2½	5.750	.001
	3¾	8.626	.002
	5	11.501	.004
	6¼	14.376	.006
	7½	17.252	.009
	10	23.002	.017
	12½	28.753	.026
	15	34.503	.037
For latitude 42°	1¼	2.876	0.000
	2½	5.751	.001
	3¾	8.627	.002
	5	11.503	.004
	6¼	14.379	.007
	7½	17.255	.009
	10	23.006	.017
	12½	28.758	.026
	15	34.509	.038

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval: 1′	1¼′	2½′	3¾′	5′	7½′
° ′	Inches	Inches	Inches	Inches	Inches	Inches
42 00	1.716	2.145	4.290	6.435	8.580	12.871
02½	.715	.144	.287	.431	.575	.862
03¾	.714	.143	.286	.429	.572	.858
05	.714	.142	.285	.427	.569	.854
07½	.713	.141	.282	.423	.564	.845
10	1.712	2.140	4.279	6.418	8.558	12.837
11¼	.711	.139	.278	.416	.555	.833
12½	.711	.138	.276	.414	.552	.829
15	.709	.137	.273	.410	.547	.820
17½	.708	.135	.271	.406	.541	.812
18¾	.708	.135	.269	.404	.538	.807
20	1.707	2.134	4.268	6.402	8.535	12.803
22½	.706	.132	.265	.397	.530	.795
25	.705	.131	.262	.393	.524	.786
26¼	.704	.130	.261	.391	.521	.782
27½	.704	.130	.259	.388	.519	.778
30	1.703	2.128	4.256	6.385	8.513	12.769
32½	.701	.127	.254	.380	.507	.761
33¾	.701	.126	.252	.378	.504	.757
35	.700	.125	.251	.376	.502	.752
37½	.699	.124	.248	.372	.496	.744
40	1.698	2.123	4.245	6.368	8.490	12.735
41¼	.697	.122	.244	.366	.487	.731
42½	.697	.121	.242	.363	.485	.727
45	.696	.120	.239	.359	.479	.718
47½	.695	.118	.237	.355	.473	.710
48¾	.694	.118	.235	.353	.470	.706
50	1.693	2.117	4.234	6.351	8.468	12.701
52½	.692	.115	.231	.346	.462	.693
55	.691	.114	.228	.342	.456	.684
56¼	.691	.113	.227	.340	.453	.680
57½	.690	.113	.225	.338	.450	.676
43 00	1.689	2.111	4.222	6.334	8.445	12.667
02½	.688	.110	.220	.329	.439	.659
03¾	.687	.109	.218	.327	.436	.654
05	.687	.108	.217	.325	.433	.650
07½	.686	.107	.214	.321	.428	.641
10	1.684	2.105	4.211	6.316	8.422	12.633
11¼	.684	.105	.210	.314	.419	.629
12½	.683	.104	.208	.312	.416	.624
15	.682	.103	.205	.308	.410	.616
17½	.681	.101	.202	.303	.405	.607
18¾	.680	.100	.201	.301	.402	.603
20	1.680	2.100	4.199	6.299	8.399	12.598
22½	.679	.098	.197	.295	.393	.590
25	.677	.097	.194	.291	.387	.581
26¼	.677	.096	.192	.289	.385	.577
27½	.676	.095	.191	.286	.382	.573
30	1.675	2.094	4.188	6.282	8.376	12.564
32½	.674	.093	.185	.278	.370	.555
33¾	.673	.092	.184	.275	.367	.551
35	.673	.091	.182	.273	.364	.547
37½	.672	.090	.179	.269	.359	.538
40	1.671	2.088	4.176	6.265	8.353	12.529
41¼	.670	.087	.175	.262	.350	.525
42½	.669	.087	.173	.260	.347	.521
45	.668	.085	.171	.256	.341	.512
47½	.667	.084	.168	.252	.336	.503
48¾	.666	.083	.166	.249	.333	.499
50	1.666	2.082	4.165	6.247	8.330	12.495
52½	.665	.081	.162	.243	.324	.486
55	.664	.080	.159	.239	.318	.477
56¼	.663	.079	.158	.236	.315	.473
57½	.662	.078	.156	.234	.312	.468
44 00	1.661	2.077	4.153	6.230	8.307	12.460

Ordinates of developed parallel and meridional distances

Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	Inches	Inch
For latitude 42°	1¼	2.876	0.000
	2½	5.751	.001
	3¾	8.627	.002
	5	11.503	.004
	6¼	14.379	.007
	7½	17.255	.009
	10	23.006	.017
	12½	28.758	.026
	15	34.509	.038
For latitude 43°	1¼	2.876	0.000
	2½	5.752	.001
	3¾	8.629	.002
	5	11.505	.004
	6¼	14.382	.007
	7½	17.258	.009
	10	23.010	.017
	12½	28.763	.026
	15	34.515	.038
For latitude 44°	1¼	2.877	0.000
	2½	5.753	.001
	3¾	8.630	.002
	7	11.507	.004
	5¼	14.384	.007
	6½	17.261	.009
	10	23.014	.017
	12½	28.768	.026
	15	34.521	.038

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$—Continued

Latitude of parallel	Abscissas of developed parallel					
	Longitude interval					
	1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
44 00	1.661	2.077	4.153	6.230	8.307	12.460
02½	.660	.075	.150	.226	.301	.451
03¾	.660	.074	.149	.223	.298	.447
05	.659	.074	.147	.221	.295	.442
07½	.658	.072	.145	.217	.289	.434
10	1.657	2.071	4.142	6.212	8.283	12.425
11¼	.656	.070	.140	.210	.280	.420
12½	.656	.069	.139	.208	.277	.416
15	.654	.068	.136	.204	.272	.407
17½	.653	.066	.133	.199	.266	.399
18¾	.653	.066	.131	.197	.263	.394
20	1.652	2.065	4.130	6.195	8.260	12.390
22½	.651	.064	.127	.191	.254	.381
25	.650	.062	.124	.186	.248	.372
26¼	.649	.061	.123	.184	.245	.369
27½	.648	.061	.121	.182	.242	.364
30	1.647	2.059	4.118	6.177	8.236	12.355
32½	.646	.058	.115	.173	.231	.346
33¾	.645	.057	.114	.171	.228	.341
35	.645	.056	.112	.169	.225	.337
37½	.644	.055	.109	.164	.219	.328
40	1.643	2.053	4.106	6.160	8.213	12.319
41¼	.642	.052	.105	.158	.210	.315
42½	.641	.052	.104	.155	.207	.311
45	.640	.050	.101	.151	.201	.302
47½	.639	.049	.098	.146	.195	.293
48¾	.639	.048	.096	.144	.192	.289
50	1.638	2.047	4.095	6.142	8.189	12.284
52½	.637	.046	.092	.138	.184	.275
55	.636	.044	.089	.133	.178	.266
56¼	.635	.044	.087	.131	.175	.262
57½	.634	.043	.086	.129	.172	.258
45 00	1.633	2.041	4.083	6.124	8.166	12.249
02½	.632	.040	.080	.120	.160	.240
03¾	.631	.039	.078	.118	.157	.235
05	.631	.038	.077	.115	.154	.231
07½	.630	.037	.074	.111	.148	.222
10	1.629	2.036	4.071	6.107	8.142	12.213
11¼	.628	.035	.070	.105	.139	.209
12½	.627	.034	.068	.102	.136	.204
15	.626	.033	.065	.098	.130	.195
17½	.625	.031	.062	.093	.124	.186
18¾	.624	.030	.061	.091	.121	.182
20	1.624	2.030	4.059	6.089	8.118	12.177
22½	.622	.028	.056	.084	.112	.168
25	.621	.027	.053	.080	.106	.160
26¼	.621	.026	.052	.078	.103	.155
27½	.620	.025	.050	.075	.100	.151
30	1.619	2.024	4.047	6.071	8.094	12.142
32½	.618	.022	.044	.066	.088	.133
33¾	.617	.021	.043	.064	.085	.128
35	.616	.021	.041	.062	.082	.124
37½	.615	.019	.038	.057	.076	.115
40	1.614	2.018	4.035	6.053	8.070	12.106
41¼	.613	.017	.034	.051	.067	.101
42½	.613	.016	.032	.048	.065	.097
45	.612	.015	.029	044	.059	.088
47½	.611	.013	.026	.039	.053	.079
48¾	.610	.012	.025	.037	.050	.074
50	1.609	2.012	4.023	6.035	8.047	12.070
52½	.608	.010	.020	.030	.040	.061
55	.607	.009	.017	.026	.034	.052
56¼	.606	.008	.016	.024	.031	.047
57½	.606	.007	.014	.021	.028	.043
46 00	1.605	2.006	4.011	6.017	8.022	12.034

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 44°	1¼	2.877	0.000
	2½	5.753	.001
	3¾	8.630	.002
	5	11.507	.004
	6¼	14.384	.007
	7½	17.261	.009
	10	23.014	.017
	12½	28.768	.026
	15	34.521	.038
For latitude 45°	1¼	2.877	0.000
	2½	5.755	.001
	3¾	8.632	.002
	5	11.509	.004
	6¼	14.387	.007
	7½	17.264	.009
	10	23.018	.017
	12½	28.773	.026
	15	34.527	.038
For latitude 46°	1¼	2.878	0.000
	2½	5.756	.001
	3¾	8.633	.002
	5	11.511	.004
	6¼	14.389	.007
	7½	17.267	.009
	10	23.022	.017
	12½	28.778	.026
	15	34.534	.038

TABLE 3.—*Coordinates for the projection of maps, scale $\frac{1}{31680}$*—Continued

Latitude of parallel	Abscissas of developed parallel					
	Longitude interval					
	1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
46 00	1.605	2.006	4.011	6.017	8.022	12.034
02½	.603	.004	.008	.012	.016	.025
03¾	.603	.003	.007	.010	.013	.020
05	.602	.003	.005	.008	.010	.016
07½	.601	.001	.002	.003	.004	.007
10	1.600	2.000	3.999	5.999	7.998	11.998
11¼	.599	1.999	.998	.996	.995	.993
12½	.598	.998	.996	.994	.992	.988
15	.597	.997	.993	.990	.986	.979
17½	.596	.995	.990	.985	.980	.970
18¾	.595	.994	.989	.983	.977	.966
20	1.595	1.994	3.987	5.981	7.974	11.961
22½	.594	.992	.984	.976	.968	.952
25	.592	.990	.981	.972	.962	.943
26¼	.592	.990	.979	.969	.959	.938
27½	.591	.989	.978	.967	.956	.934
30	1.590	1.987	3.975	5.962	7.950	11.925
32½	.589	.986	.972	.958	.944	.916
33¾	.588	.985	.970	.956	.941	.911
35	.588	.984	.969	.953	.938	.907
37½	.586	.983	.966	.949	.932	.897
40	1.585	1.981	3.963	5.944	7.926	11.888
41¼	.584	.981	.961	.942	.923	.884
42½	.584	.980	.960	.940	.919	.879
45	.583	.978	.957	.935	.913	.870
47½	.581	.977	.954	.930	.907	.861
48¾	.581	.976	.952	.928	.904	.856
50	1.580	1.975	3.951	5.926	7.901	11.852
52½	.579	.974	.948	.921	.895	.843
55	.578	.972	.944	.917	.889	.833
56¼	.577	.971	.943	.914	.886	.829
57½	.577	.971	.941	.912	.883	.824
47 00	1.575	1.969	3.938	5.908	7.877	11.815
02½	.574	.968	.935	.903	.871	.806
03¾	.574	.967	.934	.901	.868	.801
05	.573	.966	.932	.898	.864	.797
07½	.572	.965	.929	.894	.858	.788
10	1.570	1.963	3.926	5.889	7.852	11.778
11¼	.570	.962	.925	.887	.849	.774
12½	.569	.962	.923	.885	.846	.769
15	.568	.960	.920	.880	.840	.760
17½	.567	.958	.917	.875	.834	.751
18¾	.566	.958	.915	.873	.831	.746
20	1.565	1.957	3.914	5.871	7.828	11.741
22½	.564	.955	.911	.866	.821	.732
25	.563	.954	.908	.861	.815	.723
26¼	.562	.953	.906	.859	.812	.718
27½	.562	.952	.905	.857	.809	.714
30	1.561	1.951	3.901	5.852	7.803	11.704
32½	.559	.949	.898	.848	.797	.695
33¾	.559	.948	.897	.845	.794	.691
35	.558	.948	.895	.843	.791	.686
37½	.557	.946	.892	.838	.784	.677
40	1.556	1.945	3.889	5.834	7.778	11.667
41¼	.555	.944	.888	.831	.775	.663
42½	.554	.943	.886	.829	.772	.658
45	.553	.941	.883	.824	.766	.649
47½	.552	.940	.880	.820	.760	.639
48¾	.551	.939	.878	.817	.757	.635
50	1.551	1.938	3.877	5.815	7.753	11.630
52½	.549	.937	.874	.810	.747	.621
55	.548	.935	.871	.806	.741	.612
56¼	.548	.934	.869	.803	.738	.607
57½	.547	.934	.867	.801	.735	.602
48 00	1.546	1.932	3.864	5.796	7.729	11.593

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 46°	1¼	2.878	0.000
	2½	5.756	.001
	3¾	8.633	.002
	5	11.511	.004
	6¼	14.389	.007
	7½	17.267	.009
	10	23.022	.017
	12½	28.778	.026
	15	34.534	.038
For latitude 47°	1¼	2.878	0.000
	2½	5.757	.001
	3¾	8.635	.002
	5	11.513	.004
	6¼	14.392	.007
	7½	17.270	.009
	10	23.026	.017
	12½	28.784	.026
	15	34.540	.038
For latitude 48°	1¼	2.879	0.000
	2½	5.758	.001
	3¾	8.636	.002
	5	11.515	.004
	6¼	14.394	.007
	7½	17.273	.009
	10	23.030	.017
	12½	28.789	.026
	15	34.546	.038

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	Inches	Inches	Inches	Inches	Inches	Inches
48 00	1.546	1.932	3.864	5.796	7.729	11.593
02½	.544	.931	.861	.792	.722	.583
03¾	.544	.930	.860	.789	.719	.579
05	.543	.929	.858	.787	.716	.574
07½	.542	.927	.855	.782	.710	.565
10	1.541	1.926	3.852	5.778	7.704	11.555
11¼	.540	.925	.850	.775	.701	.551
12½	.540	.924	.849	.773	.697	.546
15	.538	.923	.846	.768	.691	.537
17½	.537	.921	.842	.764	.685	.527
18¾	.536	.920	.841	.761	.682	.523
20	1.536	1.920	3.839	5.759	7.679	11.518
22½	.534	.918	.836	.754	.672	.509
25	.533	.917	.833	.750	.666	.499
26¼	.533	.916	.831	.747	.663	.494
27½	.532	.915	.830	.745	.660	.490
30	1.531	1.913	3.827	5.740	7.654	11.480
32½	.529	.912	.824	.735	.647	.471
33¾	.529	.911	.822	.733	.644	.466
35	.528	.910	.820	.731	.641	.462
37½	.527	.909	.817	.726	.635	.452
40	1.526	1.907	3.814	5.721	7.628	11.443
41¼	.525	.906	.813	.719	.625	.438
42½	.524	.905	.811	.717	.622	.433
45	.523	.904	.808	.712	.616	.424
47½	.522	.902	.805	.707	.610	.414
48¾	.521	.902	.803	.705	.606	.410
50	1.521	1.901	3.802	5.702	7.603	11.405
52½	.519	.899	.798	.698	.597	.395
55	.518	.898	.795	.693	.591	.386
56¼	.518	.897	.794	.691	.587	.381
57½	.517	.896	.792	.688	.584	.376
49 00	1.516	1.894	3.789	5.684	7.578	11.367
02½	.514	.893	.786	.679	.572	.358
03¾	.514	.892	.784	.676	.569	.353
05	.513	.891	.783	.674	.565	.348
07½	.512	.890	.780	.669	.559	.339
10	1.511	1.888	3.776	5.665	7.553	11.329
11¼	.510	.887	.775	.662	.550	.324
12½	.509	.887	.773	.660	.546	.320
15	.508	.885	.770	.655	.540	.310
17½	.507	.883	.767	.650	.534	.301
18¾	.506	.883	.765	.648	.531	.296
20	1.505	1.882	3.764	5.646	7.527	11.291
22½	.504	.880	.760	.641	.521	.281
25	.503	.879	.757	.636	.515	.272
26¼	.502	.878	.756	.634	.511	.267
27½	.502	.877	.754	.631	.508	.262
30	1.500	1.875	3.751	5.626	7.502	11.253
32½	.499	.874	.748	.622	.496	.243
33¾	.498	.873	.746	.619	.492	.238
35	.498	.872	.745	.617	.489	.234
37½	.497	.871	.741	.612	.483	.224
40	1.495	1.869	3.738	5.607	7.476	11.215
41¼	.495	.868	.737	.605	.473	.210
42½	.494	.867	.735	.602	.470	.205
45	.493	.866	.732	.598	.464	.195
47½	.492	.864	.729	.593	.457	.186
48¾	.491	.863	.727	.591	.454	.181
50	1.490	1.863	3.725	5.588	7.451	11.176
52½	.489	.861	.722	.583	.444	.167
55	.488	.860	.719	.578	.438	.157
56¼	.487	.859	.717	.576	.435	.152
57½	.486	.858	.716	.574	.432	.147
50 00	1.485	1.856	3.713	5.569	7.425	11.138

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	Inches	Inch
For latitude 48°	1¼	2.879	0.000
	2½	5.758	.001
	3¾	8.636	.002
	5	11.515	.004
	6¼	14.394	.007
	7½	17.273	.009
	10	23.030	.017
	12½	28.789	.026
	15	34.546	.038
For latitude 49°	1¼	2.879	0.000
	2½	5.759	.001
	3¾	8.638	.002
	5	11.517	.004
	6¼	14.397	.007
	7½	17.276	.009
	10	23.034	.017
	12½	28.794	.026
	15	34.552	.037
For latitude 50°	1¼	2.880	0.000
	2½	5.760	.001
	3¾	8.639	.002
	5	11.519	.004
	6¼	14.399	.006
	7½	17.279	.009
	10	23.039	.017
	12½	28.799	.026
	15	34.558	.037

TABLE 3.—*Coordinates for the projection of maps, scale* $\frac{1}{31680}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
50 00	1.485	1.856	3.713	5.569	7.425	11.138
02½	.484	.855	.709	.564	.419	.128
03¾	.483	.854	.708	.562	.416	.123
05	.482	.853	.706	.559	.412	.118
07½	.481	.851	.703	.554	.406	.109
10	1.480	1.850	3.700	5.550	7.399	11.099
11¼	.479	.849	.698	.547	.396	.094
12½	.479	.848	.697	.545	.393	.090
15	.477	.847	.693	.540	.387	.080
17½	.476	845	.690	.535	.380	.070
18¾	.475	.844	.688	.533	.377	.065
20	1.475	1.843	3.687	5.530	7.374	11.061
22½	.473	.842	.684	.525	.367	.051
25	.472	.840	.680	.521	.361	.041
26¼	.471	.839	.679	.518	.358	.036
27½	.471	.839	.677	.516	.354	.031
30	1.470	1.837	3.674	5.511	7.348	11.022
32½	.468	.835	.671	.506	.341	.012
33¾	.468	.835	.669	.504	.338	.007
35	.467	.834	.667	.501	.335	.002
37½	.466	.832	.664	.496	.328	10.993
40	1.464	1.830	3.661	5.491	7.322	10.983
41¼	.464	.830	.659	.489	.319	.978
42½	.463	.829	.658	.487	.316	.973
45	.462	.827	.655	.482	.309	.964
47½	.461	.826	.651	.477	.303	.954
48¾	.460	.825	.650	.474	.299	.949
50	1.459	1.824	3.648	5.472	7.296	10.944
52½	.458	.822	.645	.467	.290	.934
55	.457	.821	.642	.462	.283	.925
56¼	.456	.820	.640	.460	.280	.920
57½	.455	.819	.638	.457	.277	.915
51 00	1.454	1.818	3.635	5.453	7.270	10.905
02½	.453	.816	.632	.448	.264	.895
03¾	.452	.815	.630	.445	.260	.890
05	.451	.814	.628	.443	.257	.886
07½	.450	.813	.625	.438	.250	.876
10	1.449	1.811	3.622	5.433	7.244	10.866
11¼	.448	.810	.620	.431	.241	.861
12½	.447	.809	.619	.428	.237	.856
15	.446	.808	.615	.423	.231	.846
17½	.445	.806	.612	.418	.224	.837
18¾	.444	.805	.611	.416	.221	.832
20	1.444	1.804	3.609	5.413	7.218	10.827
22½	.442	.803	.606	.408	.211	.817
25	.441	.801	.602	.404	.205	.807
26¼	.440	.800	.601	.401	.201	.802
27½	.440	.800	.599	.399	.198	.797
30	1.438	1.798	3.596	5.394	7.192	10.787
32½	.437	.796	.593	.389	.185	.778
33¾	.436	.795	.591	.386	.182	.773
35	.436	.795	.589	.384	.178	.768
37½	.434	.793	.586	.379	.172	.758
40	1.433	1.791	3.583	5.374	7.165	10.748
41¼	.432	.791	.581	.372	.162	.743
42½	.432	.790	.579	.369	.159	.738
45	.430	.788	.576	.364	.152	.728
47½	.429	.786	.573	.359	.146	.718
48¾	.428	.786	.571	.357	.142	.713
50	1.428	1.785	3.570	5.354	7.139	10.709
52½	.426	.783	.566	.349	.132	.699
55	.425	.781	.563	.344	.126	.689
56¼	.425	.781	.561	.342	.123	.684
57½	.424	.780	.560	.339	.119	.679
52 00	1.423	1.778	3.556	5.334	7.113	10.669

Ordinates of developed parallel and meridional distances

Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 50°	1¼	2.880	0.000
	2½	5.760	.001
	3¾	8.639	.002
	5	11.519	.004
	6¼	14.399	.006
	7½	17.279	.009
	10	23.039	.017
	12½	28.799	.026
	15	34.558	.037
For latitude 51°	1¼	2.880	0.000
	2½	5.761	.001
	3¾	8.641	.002
	5	11.521	.004
	6¼	14.402	.006
	7½	17.282	.009
	10	23.043	.016
	12½	28.804	.026
	15	34.564	.037
For latitude 52°	1¼	2.881	0.000
	2½	5.762	.001
	3¾	8.643	.002
	5	11.523	.004
	6¼	14.404	.006
	7½	17.285	.009
	10	23.046	.016
	12½	28.809	.025
	15	34.570	.037

TABLE 4.—*Coordinates for the projection of maps, scale* $\frac{1}{24000}$

Latitude of parallel	Abscissas of developed parallel					
	Longitude interval					
	1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
0 00	3.043	3.804	7.609	11.413	15.217	22.826
02½	.043	.804	.609	.413	.217	.826
03¾	.043	.804	.609	.413	.217	.826
05	.043	.804	.609	.413	.217	.826
07½	.043	.804	.609	.413	.217	.826
10	3.043	3.804	7.609	11.413	15.217	22.826
11¼	.043	.804	.609	.413	.217	.826
12½	.043	.804	.609	.413	.217	.826
15	.043	.804	.609	.413	.217	.826
17½	.043	.804	.609	.413	.217	.826
18¾	.043	.804	.609	.413	.217	.826
20	3.043	3.804	7.609	11.413	15.217	22.826
22½	.043	.804	.609	.413	.217	.826
25	.043	.804	.609	.413	.217	.826
26¼	.043	.804	.609	.413	.217	.826
27½	.043	.804	.609	.413	.217	.826
30	3.043	3.804	7.609	11.413	15.217	22.826
32½	.043	.804	.608	.413	.217	.825
33¾	.043	.804	.608	.413	.217	.825
35	.043	.804	.608	.413	.217	.825
37½	.043	.804	.608	.413	.217	.825
40	3.043	3.804	7.608	11.412	15.217	22.825
41¼	.043	.804	.608	.412	.216	.825
42½	.043	.804	.608	.412	.216	.825
45	.043	.804	.608	.412	.216	.824
47½	.043	.804	.608	.412	.216	.824
48¾	.043	.804	.608	.412	.216	.824
50	3.043	3.804	7.608	11.412	15.216	22.824
52½	.043	.804	.608	.412	.216	.824
55	.043	.804	.608	.412	.216	.823
56¼	.043	.804	.608	.412	.215	.823
57½	.043	.804	.608	.412	.215	.823
1 00	3.043	3.804	7.608	11.411	15.215	22.823
02½	.043	.804	.608	.411	.215	.823
03¾	.043	.804	.607	.411	.215	.822
05	.043	.804	.607	.411	.215	.822
07½	.043	.804	.607	.411	.215	.822
10	3.043	3.804	7.607	11.411	15.214	22.822
11¼	.043	.804	.607	.411	.214	.821
12½	.043	.804	.607	.411	.214	.821
15	.043	.803	.607	.410	.214	.821
17½	.043	.803	.607	.410	.214	.820
18¾	.043	.803	.607	.410	.214	.820
20	3.043	3.803	7.607	11.410	15.213	22.820
22½	.043	.803	.607	.410	.213	.820
25	.043	.803	.606	.410	.213	.819
26¼	.043	.803	.606	.410	.213	.819
27½	.043	.803	.606	.409	.213	.819
30	3.042	3.803	7.606	11.409	15.212	22.819
32½	.042	.803	.606	.409	.212	.818
33¾	.042	.803	.606	.409	212	.818
35	.042	.803	.606	.409	.212	.818
37½	.042	.803	.606	.409	.211	.817
40	3.042	3.803	7.606	11.408	15.211	22.817
41¼	.042	.803	.605	.408	.211	.816
42½	.042	.803	.605	.408	.211	.816
45	.042	.803	.605	.408	.210	.816
47½	.042	.803	.605	.408	.210	.815
48¾	.042	.802	.605	.407	.210	.815
50	3.042	3.802	7.605	11.407	15.210	22.815
52½	.042	.802	.605	.407	.209	.814
55	.042	.802	.605	.407	.209	.814
56¼	.042	.802	.604	.407	.209	813
57½	.042	.802	.604	.407	.209	.813
2 00	3.042	3.802	7.604	11.406	15.208	22.812

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 0°	1¼	3.779	0.000
	2½	7.557	.000
	3¾	11.336	.000
	5	15.114	.000
	6¼	18.893	.000
	7½	22.672	.000
	10	30.229	.000
	12½	37.786	.000
	15	45.344	.000
For latitude 1°	1¼	3.779	0.000
	2½	7.557	.000
	3¾	11.336	.000
	5	15.115	.000
	6¼	18.893	.000
	7½	22.672	.000
	10	30.229	.001
	12½	37.787	.001
	15	45.344	.002
For latitude 2°	1¼	3.779	0.000
	2½	7.557	.000
	3¾	11.336	.000
	5	15.115	.000
	6¼	18.893	.001
	7½	22.672	.001
	10	30.229	.001
	12½	37.787	.002
	15	45.344	.003

TABLE 4.—*Coordinates for the projection of maps, scale* $\frac{1}{24000}$—Continued

Latitude of parallel	Abscissas of developed parallel					
	Longitude interval					
	1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
2 00	3.042	3.802	7.604	11.406	15.208	22.812
02½	.042	.802	.604	.406	.208	.812
03¾	.042	.802	.604	.406	.208	.812
05	.041	.802	.604	.406	.207	.811
07½	.041	.802	.604	.405	.207	.811
10	3.041	3.802	7.603	11.405	15.207	22.810
11¼	.041	.802	.603	.405	.206	.810
12½	.041	.802	.603	.405	.206	.809
15	.041	.801	.603	.404	.206	.809
17½	.041	.801	.603	.404	.205	.808
18¾	.041	.801	.603	.404	.205	.808
20	3.041	3.801	7.602	11.404	15.205	22.808
22½	.041	.801	.602	.403	.205	.807
25	.041	.801	.602	.403	.204	.806
26¼	.041	.801	.602	.403	.204	.806
27½	.041	.801	.602	.403	.204	.805
30	3.041	3.801	7.602	11.402	15.203	22.805
32½	.041	.801	.601	.402	.203	.804
33¾	.041	.801	.601	.402	.202	.804
35	.040	.801	.601	.402	.202	.803
37½	.040	.800	.601	.401	.202	.802
40	3.040	3.800	7.601	11.401	15.201	22.802
41¼	.040	.800	.600	.401	.201	.801
42½	.040	.800	.600	.400	.201	.801
45	.040	.800	.600	.400	.200	.800
47½	.040	.800	.600	.400	.200	.799
48¾	.040	.800	.600	.400	.199	.799
50	3.040	3.800	7.600	11.399	15.199	22.799
52½	.040	.800	.599	.399	.198	.798
55	.039	.799	.599	.398	.198	.797
56¼	.039	.799	.599	.398	.198	.796
57½	.039	.799	.599	.398	.197	.796
3 00	3.039	3.799	7.598	11.398	15.197	22.795
02½	.039	.799	.598	.397	.196	.794
03¾	.039	.799	.598	.397	.196	.794
05	.039	.799	.598	.397	.196	.794
07½	.039	.799	.598	.396	.195	.793
10	3.039	3.799	7.597	11.396	15.195	22.792
11¼	.039	.799	.597	.396	.194	.791
12½	.039	.798	.597	.395	.194	.791
15	.039	.798	.597	.395	.193	.790
17½	.039	.798	.596	.394	.193	.789
18¾	.038	.798	.596	.394	.192	.788
20	3.038	3.798	7.596	11.394	15.192	22.788
22½	.038	.798	.596	.393	.191	.787
25	.038	.798	.595	.393	.191	.786
26¼	.038	.798	.595	.393	.190	.786
27½	.038	.798	.595	.393	.190	.785
30	3.038	3.797	7.595	11.392	15.189	22.784
32½	.038	.797	.594	.391	.189	.783
33¾	.038	.797	.594	.391	.188	.782
35	.038	.797	.594	.391	.188	.782
37½	.037	.797	.594	.390	.187	.781
40	3.037	3.797	7.593	11.390	15.187	22.780
41¼	.037	.797	.593	.390	.186	.779
42½	.037	.796	.593	.389	.186	.779
45	.037	.796	.593	.389	.185	.778
47½	.037	.796	.592	.388	.184	.777
48¾	.037	.796	.592	.388	.184	.776
50	3.037	3.796	7.592	11.388	15.184	22.776
52½	.037	.796	.591	.387	.183	.774
55	.036	.796	.591	.387	.182	.773
56¼	.036	.795	.591	.386	.182	.773
57½	.036	.795	.591	.386	.181	.772
4 00	3.036	3.795	7.590	11.386	15.181	22.771

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 2°	1¼	3.779	0.000
	2½	7.557	.000
	3¾	11.336	.000
	5	15.115	.000
	6¼	18.893	.001
	7½	22.672	.001
	10	30.229	.001
	12½	37.787	.002
	15	45.344	.003
For latitude 3°	1¼	3.779	0.000
	2½	7.557	.000
	3¾	11.336	.000
	5	15.115	.001
	6¼	18.894	.001
	7½	22.673	.001
	10	30.230	.002
	12½	37.788	.004
	15	45.345	.005
For latitude 4°	1¼	3.779	0.000
	2½	7.558	.000
	3¾	11.337	.000
	5	15.115	.001
	6¼	18.894	.001
	7½	22.673	.002
	10	30.231	.003
	12½	37.788	.005
	15	45.346	.007

TABLE 4.—*Coordinates for the projection of maps, scale $\frac{1}{24000}$*—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
4 00	3.036	3.795	7.590	11.386	15.181	22.771
02½	.036	.795	.590	.385	.180	.770
03¾	.036	.795	.590	.385	.180	.769
05	.036	.795	.590	.385	.179	.769
07½	.036	.795	.589	.384	.178	.768
10	3.036	3.794	7.589	11.383	15.178	22.766
11¼	.035	.794	.589	.383	.177	.766
12½	.035	.794	.588	.383	.177	.765
15	.035	.794	.588	.382	.176	.764
17½	.035	.794	.588	.381	.175	.763
18¾	.035	.794	.587	.381	.175	.762
20	3.035	3.794	7.587	11.381	15.174	22.762
22½	.035	.793	.587	.380	.174	.760
25	.035	.793	.586	.380	.173	.759
26¼	.034	.793	.586	.379	.172	.758
27½	.034	.793	.586	.379	.172	.758
30	3.034	3.793	7.585	11.378	15.171	22.756
32½	.034	.793	.585	.378	.170	.755
33¾	.034	.792	.585	.377	.170	.755
35	.034	.792	.585	.377	.169	.754
37½	.034	.792	.584	.376	.168	.753
40	3.033	3.792	7.584	11.376	15.167	22.751
41¼	.033	.792	.584	.375	.167	.751
42½	.033	.792	.583	.375	.167	.750
45	.033	.791	.583	.374	.166	.748
47½	.033	.791	.582	.374	.165	.747
48¾	.033	.791	.582	.373	.164	.746
50	3.033	3.791	7.582	11.373	15.164	22.746
52½	.033	.791	.581	.372	.163	.744
55	.032	.790	.581	.371	.162	.743
56¼	.032	.790	.581	.371	.161	.742
57½	.032	.790	.580	.371	.161	.741
5 00	3.032	3.790	7.580	11.370	15.160	22.740
02½	.032	.790	.580	.369	.159	.739
03¾	.032	.790	.579	.369	.159	.738
05	.032	.790	.579	.369	.158	.737
07½	.031	.789	.579	.368	.157	.736
10	3.031	3.789	7.578	11.367	15.157	22.734
11¼	.031	.789	.578	.367	.156	.733
12½	.031	.789	.578	.366	.155	.733
15	.031	.789	.577	.366	.154	.731
17½	.031	.788	.577	.365	.153	.730
18¾	.031	.788	.576	.364	.153	.729
20	3.030	3.788	7.576	11.364	15.152	22.728
22½	.030	.788	.575	.363	.151	.726
25	.030	.787	.575	.362	.150	.725
26¼	.030	.787	.575	.362	.149	.724
27½	.030	.787	.574	.362	.149	.723
30	3.030	3.787	7.574	11.361	15.148	22.722
32½	.029	.787	.573	.360	.147	.720
33¾	.029	.787	.573	.360	.146	.720
35	.029	.786	.573	.359	.146	.719
37½	.029	.786	.572	.359	.145	.717
40	3.029	3.786	7.572	11.358	15.144	22.716
41¼	.029	.786	.572	.357	.143	.715
42½	.029	.786	.571	.357	.143	.714
45	.028	.785	.571	.356	.141	.712
47½	.028	.785	.570	.355	.140	.710
48¾	.028	.785	.570	.355	.140	.710
50	3.028	3.785	7.570	11.354	15.139	22.709
52½	.028	.785	.569	.354	.138	.707
55	.027	.784	.568	.353	.137	.705
56¼	.027	.784	.568	.352	.136	.705
57½	.027	.784	.568	.352	.136	.704
6 00	3.027	3.784	7.567	11.351	15.135	22.702

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals	′	Meridional distance	Ordinate of developed parallel
		Inches	*Inch*
For latitude 4°	1¼	3.779	0.000
	2½	7.558	.000
	3¾	11.337	.000
	5	15.115	.001
	6¼	18.894	.001
	7½	22.673	.002
	10	30.231	.003
	12½	37.788	.005
	15	45.346	.007
For latitude 5°	1¼	3.779	0.000
	2½	7.558	.000
	3¾	11.337	.001
	5	15.116	.001
	6¼	18.894	.001
	7½	22.674	.002
	10	30.231	.004
	12½	37.789	.006
	15	45.347	.009
For latitude 6°	1¼	3.779	0.000
	2½	7.558	.000
	3¾	11.337	.001
	5	15.116	.001
	6¼	18.895	.002
	7½	22.674	.003
	10	30.233	.005
	12½	37.791	.007
	15	45.349	.010

TABLE 4.—*Coordinates for the projection of maps, scale $\frac{1}{24000}$*—Continued

Latitude of parallel	Abscissas of developed parallel					
	Longitude interval					
	1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
6 00	3.027	3.784	7.567	11.351	15.135	22.702
02½	.027	.783	.567	.350	.134	.700
03¾	.027	.783	.566	.350	.133	.699
05	.027	.783	.566	.349	.132	.699
07½	.026	.783	.566	.348	.131	.697
10	3.026	3.783	7.565	11.348	15.130	22.695
11¼	.026	.782	.565	.347	.129	.694
12½	.026	.782	.564	.347	.129	.693
15	.026	.782	.564	.346	.128	.691
17½	.025	.782	.563	.345	.126	.690
18¾	.025	.781	.563	.344	.126	.689
20	3.025	3.781	7.563	11.344	15.125	22.688
22½	.025	.781	.562	.343	.124	.686
25	.025	.781	.561	.342	.123	.684
26¼	.024	.781	.561	.342	.122	.683
27½	.024	.780	.561	.341	.122	.682
30	3.024	3.780	7.560	11.340	15.120	22.681
32½	.024	.780	.560	.339	.119	.679
33¾	.024	.780	.559	.339	.118	.678
35	.024	.779	.559	.338	.118	.677
37½	.023	.779	.558	.337	.117	.675
40	3.023	3.779	7.558	11.336	15.115	22.673
41¼	.023	.779	.557	.336	.115	.672
42½	.023	.778	.557	.335	.114	.671
45	.023	.778	.556	.335	.113	.669
47½	.022	.778	.556	.334	.111	.667
48¾	.022	.778	.555	.333	.111	.666
50	3.022	3.778	7.555	11.333	15.110	22.665
52½	.022	.777	.554	.332	.109	.663
55	.021	.777	.554	.331	.107	.661
56¼	.021	.777	.553	.330	.107	.660
57½	.021	.777	.553	.330	.106	.659
7 00	3.021	3.776	7.552	11.329	15.105	22.657
02½	.021	.776	.552	.328	.103	.655
03¾	.021	.776	.551	.327	.103	.654
05	.020	.776	.551	.327	.102	.653
07½	.020	.775	.550	.326	.101	.651
10	3.020	3.775	7.550	11.325	15.099	22.649
11¼	.020	.775	.549	.324	.099	.648
12½	.020	.774	.549	.323	.098	.647
15	.019	.774	.548	.322	.097	.645
17½	.019	.774	.548	.321	.095	.643
18¾	.019	.774	.547	.321	.095	.642
20	3.019	3.773	7.547	11.320	15.094	22.641
22½	.019	.773	.546	.319	.093	.640
25	.018	.773	.546	.318	.091	.637
26¼	.018	.773	.545	.318	.090	.635
27½	.018	.772	.545	.317	.090	.634
30	3.018	3.772	7.544	11.316	15.088	22.632
32½	.017	.772	.543	.315	.087	.630
33¾	.017	.771	.543	.315	.086	.629
35	.017	.771	.543	.314	.085	.628
37½	.017	.771	.542	.313	.084	.626
40	3.017	3.771	7.541	11.312	15.082	22.624
41¼	.016	.770	.541	.311	.082	.623
42½	.016	.770	.540	.311	.081	.621
45	.016	.770	.540	.310	.079	.619
47½	.016	.769	.539	.308	.078	.617
48¾	.015	.769	.439	.308	.077	.616
50	3.015	3.769	7.538	11.307	15.076	22.615
52½	.015	.769	.537	.306	.075	.612
55	.015	.768	.537	.305	.073	.610
56¼	.015	.768	.536	.305	.073	.609
57½	.014	.768	.536	.304	.072	.608
8 00	3.014	3.768	7.535	11.303	15.070	22.606

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 6°	1¼	3.779	0.000
	2½	7.558	.000
	3¾	11.337	.001
	5	15.116	.001
	6¼	18.895	.002
	7½	22.674	.003
	10	30.233	.005
	12½	37.791	.007
	15	45.349	.010
For latitude 7°	1¼	3.779	0.000
	2½	7.558	.000
	3¾	11.338	.001
	5	15.117	.001
	6¼	18.896	.002
	7½	22.675	.003
	10	30.234	.005
	12½	37.792	.008
	15	45.351	.012
For latitude 8°	1¼	3.779	0.000
	2½	7.559	.000
	3¾	11.338	.001
	5	15.118	.001
	6¼	18.897	.002
	7½	22.676	.003
	10	30.235	.006
	12½	37.794	.010
	15	45.353	.014

TABLE 4.—*Coordinates for the projection of maps, scale* $\frac{1}{24000}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
8 00	3.014	3.768	7.535	11.303	15.070	22.606
02½	.014	.767	.534	.302	.069	.603
03¾	.014	.767	.534	.301	.068	.602
05	.013	.767	.534	.300	.067	.601
07½	.013	.766	.533	.299	.066	.599
10	3.013	3.766	7.532	11.298	15.064	22.596
11¼	.013	.766	.532	.298	.063	.595
12½	.013	.766	.531	.297	.063	.594
15	.012	.765	.531	.296	.061	.592
17½	.012	.765	.530	.295	.059	.589
18¾	.012	.765	.529	.294	.059	.588
20	3.012	3.764	7.529	11.293	15.058	22.587
22½	.011	.764	.528	.292	.056	.585
25	.011	.764	.527	.291	.055	.582
26¼	.011	.764	.527	.290	.054	.581
27½	.011	.763	.527	.290	.053	.580
30	3.010	3.763	7.526	11.289	15.051	22.577
32½	.010	.762	.525	.287	.050	.575
33¾	.010	.762	.525	.287	.049	.574
35	.010	.762	.524	.286	.048	.572
37½	.009	.762	.523	.285	.047	.570
40	3.009	3.761	7.522	11.284	15.045	22.567
41¼	.009	.761	.522	.283	.044	.566
42½	.009	.761	.522	.282	.043	.565
45	.008	.760	.521	.281	.042	.562
47½	.008	.760	.520	.280	.040	.560
48¾	.008	.760	.520	.279	.039	.559
50	3.008	3.760	7.519	11.279	15.038	22.557
52½	.007	.759	.518	.277	.036	.555
55	.007	.759	.517	.276	.035	.552
56¼	.007	.758	.517	.275	.034	.551
57½	.007	.758	.517	.275	.033	.550
9 00	3.006	3.758	7.516	11.274	15.031	22.547
02½	.006	.757	.515	.272	.030	.545
03¾	.006	.757	.514	.272	.029	.543
05	.006	.757	.514	.271	.028	.542
07½	.005	.757	.513	.270	.026	.539
10	3.005	3.756	7.512	11.268	15.024	22.537
11¼	.005	.756	.512	.268	.024	.535
12½	.005	.756	.511	.267	.023	.534
15	.004	.755	.510	.266	.021	.531
17½	.004	.755	.510	.264	.019	.529
18¾	.004	.755	.509	.264	.018	.527
20	3.003	3.754	7.509	11.263	15.017	22.526
22½	.003	.754	.508	.262	.016	.523
25	.003	.753	.507	.260	.014	.521
26¼	.003	.753	.506	.260	.013	.519
27½	.002	.753	.506	.259	.012	.518
30	3.002	3.753	7.505	11.258	15.010	22.515
32½	.002	.752	.504	.256	.008	.513
33¾	.001	.752	.504	.256	.007	.511
35	.001	.752	.503	.255	.007	.510
37½	.001	.751	.502	.254	.005	.507
40	3.001	3.751	7.501	11.252	15.003	22.504
41¼	.000	.750	.501	.251	.002	.503
42½	.000	.750	.501	.251	.001	.502
45	.000	.750	.500	249	14.999	.499
47½	2.999	.749	.499	.248	.997	.496
48¾	.999	.749	.498	.247	.996	.494
50	2.999	3.749	7.498	11.247	14.995	22.493
52½	.999	.748	.497	.245	.993	.490
55	.998	.748	.496	.244	.992	.487
56¼	.998	.748	.495	243	.991	.486
57½	.998	.748	.495	.242	.990	.485
10 00	2.998	3.747	7.494	11.241	14.988	22.482

Ordinates of developed parallel and meridional distances

Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 8°	1¼	3.779	0.000
	2½	7.559	.000
	3¾	11.338	.001
	5	15.118	.001
	6¼	18.897	.002
	7½	22.676	.003
	10	30.235	.006
	12½	37.794	.010
	15	45.353	.014
For latitude 9°	1¼	3.780	0.000
	2½	7.559	.000
	3¾	11.339	.001
	5	15.118	.002
	6¼	18.898	.003
	7½	22.678	.004
	10	30.237	.007
	12½	37.796	.011
	15	45.356	.015
For latitude 10°	1¼	3.780	0.000
	2½	7.560	.000
	3¾	11.339	.001
	5	15.119	.002
	6¼	18.899	.003
	7½	22.679	.004
	10	30.238	.008
	12½	37.798	.012
	15	45.358	.017

TABLE 4.—*Coordinates for the projection of maps, scale* $\frac{1}{24000}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
10 00	2.998	3.747	7.494	11.241	14.988	22.482
02½	.997	.747	.493	.239	.986	.479
03¾	.997	.746	.493	.239	.985	.478
05	.997	.746	.492	.238	.984	.476
07½	.996	.746	.491	.237	.982	.473
10	2.996	3.745	7.490	11.235	14.980	22.470
11¼	.996	.745	.490	.234	.979	.469
12½	.996	.745	.489	.234	.978	.467
15	.995	.744	.488	.232	.976	.464
17½	.995	.744	.487	.231	.974	.461
18¾	.995	.743	.487	.230	.973	.460
20	2.995	3.743	7.486	11.229	14.972	22.459
22½	.994	.743	.485	.228	.970	.456
25	.994	.742	.484	.226	.968	.452
26¼	.994	.742	.484	.226	.967	.451
27½	.993	.742	.483	.225	.966	.450
30	2.993	3.741	7.482	11.223	14.964	22.447
32½	.993	.741	.481	.222	.962	.444
33¾	.992	.740	.481	.221	.961	.442
35	.992	.740	.480	.220	.960	.440
37½	.992	.740	.479	.219	.958	.437
40	2.991	3.739	7.478	11.217	14.956	22.435
41¼	.991	.739	.478	.216	.955	.433
42½	.991	.739	.477	.216	.954	.431
45	.990	.738	.476	.214	.952	.428
47½	.990	.738	.475	.213	.950	.425
48¾	.990	.737	.475	.212	.949	.424
50	2.990	3.737	7.474	11.211	14.948	22.422
52½	.989	.737	.473	.210	.946	.419
55	.989	.736	.472	.208	.944	.416
56¼	.989	.736	.471	.207	.943	.414
57½	.988	.735	.471	.206	.942	.413
11 00	2.988	3.735	7.470	11.205	14.940	22.410
02½	.988	.734	.469	.203	.938	.406
03¾	.987	.734	.468	.202	.937	.405
05	.987	.734	.468	.202	.936	.403
07½	.987	.733	.467	.200	.933	.400
10	2.986	3.733	7.466	11.199	14.931	22.397
11¼	.986	.733	.465	.198	.930	.395
12½	.986	.732	.465	.197	.929	.394
15	.985	.732	.463	.195	.927	.390
17½	.985	.731	.462	.194	.925	.387
18¾	.985	.731	.462	.193	.924	.386
20	2.985	3.731	7.461	11.192	14.923	22.384
22½	.984	.730	.460	.190	.921	.381
25	.984	.730	.459	.189	.918	.378
26¼	.983	.729	.459	.188	.917	.376
27½	.983	.729	.458	.187	.916	.374
30	2.983	3.728	7.457	11.186	14.914	22.371
32½	.982	.728	.456	.184	.912	.368
33¾	.982	.728	.455	.183	.911	.366
35	.982	.727	.455	.182	.910	.364
37½	.982	.727	.454	.181	.907	.361
40	2.981	3.726	7.453	11.179	14.905	22.358
41¼	.981	.726	.452	.178	.904	.356
42½	.981	.726	.451	.177	.903	.354
45	.980	.725	.450	.176	.901	.351
47½	.980	.725	.449	.174	.899	.348
48¾	.979	.724	.449	.173	.897	.346
50	2.979	3.724	7.448	11.172	14.896	22.344
52½	.979	.724	.447	.171	.894	.341
55	.978	.723	.446	.169	.892	.338
56¼	.978	.723	.445	.168	.891	.336
57½	.978	.722	.445	.167	.889	.334
12 00	2.977	3.722	7.444	11.165	14.887	22.331

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 10°	1¼	3.780	0.000
	2½	7.560	.000
	3¾	11.339	.001
	5	15.119	.002
	6¼	18.899	.003
	7½	22.679	.004
	10	30.238	.008
	12½	37.798	.012
	15	45.358	.017
For latitude 11°	1¼	3.780	0.000
	2½	7.560	.001
	3¾	11.340	.001
	5	15.120	.002
	6¼	18.900	.003
	7½	22.680	.005
	10	30.240	.008
	12½	37.801	.013
	15	45.361	.019
For latitude 12°	1¼	3.780	0.000
	2½	7.561	.001
	3¾	11.341	.001
	5	15.121	.002
	6¼	18.902	.004
	7½	22.682	.005
	10	30.243	.009
	12½	37.804	.014
	15	45.364	.020

TABLE 4.—*Coordinates for the projection of maps, scale $\frac{1}{24000}$*—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
12 00	2.977	3.722	7.444	11.165	14.887	22.331
02½	.977	.721	.442	.164	.885	.327
03¾	.977	.721	.442	.163	.884	.326
05	.977	.721	.441	.162	.883	.324
07½	.976	.720	.440	.160	.880	.320
10	2.976	3.719	7.439	11.158	14.878	22.317
11¼	.975	.719	.438	.158	.877	.315
12½	.975	.719	.438	.157	.876	.313
15	.975	.718	.437	.155	.873	.310
17½	.974	.718	.435	.153	.871	.306
18¾	.974	.717	.435	.152	.870	.305
20	2.974	3.717	7.434	11.151	14.869	22.303
22½	.973	.717	.433	.150	.866	.299
25	.973	.716	.432	.148	.864	.296
26¼	.973	.716	.431	.147	.863	.294
27½	.972	.715	.431	.146	.862	.292
30	2.972	3.715	7.430	11.144	14.859	22.289
32½	.971	.714	.428	.143	.857	.285
33¾	.971	.714	.428	.142	.856	.283
35	.971	.714	.427	.141	.854	.281
37½	.970	.713	.426	.139	.852	.278
40	2.970	3.712	7.425	11.137	14.850	22.274
41¼	.970	.712	.424	.136	.848	.273
42½	.969	.712	.424	.135	.847	.271
45	.969	.711	.422	.134	.845	.267
47½	.968	.711	.421	.132	.842	.264
48¾	.968	.710	.421	.131	.841	.262
50	2.968	3.710	7.420	11.130	14.840	22.260
52½	.967	.709	.419	.128	.837	.256
55	.967	.709	.417	.126	.835	.252
56¼	.967	.708	.417	.125	.834	.251
57½	.966	.708	.416	.124	.832	.249
13 00	2.966	3.708	7.415	11.123	14.830	22.245
02½	.966	.707	.414	.121	.828	.241
03¾	.965	.707	.413	.120	.826	.240
05	.965	.706	.413	.119	.825	.238
07½	.965	.706	.411	.117	.823	.234
10	2.964	3.705	7.410	11.115	14.820	22.230
11¼	.964	.705	.409	.114	.819	.228
12½	.964	.704	.409	.113	.818	.226
15	.963	.704	.408	.111	.815	.223
17½	.963	.703	.406	.109	.813	.219
18¾	.962	.703	.406	.108	.811	.217
20	2.962	3.703	7.405	11.107	14.810	22.215
22½	.961	.702	.404	.106	.807	.211
25	.961	.701	.402	.104	.805	.207
26¼	.961	.701	.402	.103	.804	.205
27½	.960	.701	.401	.102	.802	.204
30	2.960	3.700	7.400	11.100	14.800	22.200
32½	.959	.699	.398	.098	.797	.196
33¾	.959	.699	.398	.097	.796	.194
35	.959	.699	.397	.096	.795	.192
37½	.958	.698	.396	.094	.792	.188
40	2.958	3.697	7.395	11.092	14.790	22.184
41¼	.958	.697	.394	.091	.788	.182
42½	.957	.697	.393	.090	.787	.180
45	.957	.696	.392	.088	.784	.176
47½	.956	.695	.391	.086	.782	.172
48¾	.956	.695	.390	.085	.780	.170
50	2.956	3.695	7.390	11.084	14.779	22.169
52½	.955	.694	.388	.082	.776	.165
55	.955	.693	.387	.080	.774	.161
56¼	.954	.693	.386	.079	.772	.159
57½	.954	.693	.386	.078	.771	.157
14 00	2.954	3.692	7.384	11.076	14.769	22.153

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 12°	1¼	3.780	0.000
	2½	7.561	.001
	3¾	11.341	.001
	5	15.121	.002
	6¼	18.902	.004
	7½	22.682	.005
	10	30.243	.009
	12½	37.804	.014
	15	45.364	.020
For latitude 13°	1¼	3.781	0.000
	2½	7.561	.001
	3¾	11.342	.001
	5	15.122	.002
	6¼	18.903	.004
	7½	22.684	.005
	10	30.245	.010
	12½	37.806	.015
	15	45.367	.022
For latitude 14°	1¼	3.781	0.000
	2½	7.562	.001
	3¾	11.343	.002
	5	15.124	.003
	6¼	18.905	.004
	7½	22.686	.006
	10	30.247	.010
	12½	37.809	.016
	15	45.371	.023

TABLE 4.—*Coordinates for the projection of maps, scale* $\frac{1}{24000}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
14 00	2. 954	3. 692	7. 384	11. 076	14. 769	22. 153
02½	. 953	. 691	. 383	. 074	. 766	. 149
03¾	. 953	. 691	. 382	. 073	. 764	. 147
05	. 953	. 691	. 381	. 072	. 763	. 145
07½	. 952	. 690	. 380	. 070	. 760	. 141
10	2. 952	3. 689	7. 379	11. 068	14. 758	22. 137
11¼	. 951	. 689	. 378	. 067	. 756	. 135
12½	. 951	. 689	. 378	. 066	. 755	. 132
15	. 950	. 688	. 376	. 064	. 752	. 128
17½	. 950	. 687	. 375	. 062	. 750	. 124
18¾	. 950	. 687	. 374	. 061	. 748	. 122
20	2. 949	3. 687	7. 373	11. 060	14. 747	22. 120
22½	. 949	. 686	. 372	. 058	. 744	. 116
25	. 948	. 685	. 371	. 056	. 741	. 112
26¼	. 948	. 685	. 370	. 055	. 740	. 110
27½	. 948	. 685	. 369	. 054	. 739	. 108
30	2. 947	3. 684	7. 368	11. 052	14. 736	22. 104
32½	. 947	. 683	. 367	. 050	. 733	. 100
33¾	. 946	. 683	. 366	. 049	. 732	. 098
35	. 946	. 683	. 365	. 048	. 730	. 096
37½	. 946	. 682	. 364	. 046	. 728	. 091
40	2. 945	3. 681	7. 362	11. 044	14. 725	22. 087
41¼	. 944	. 681	. 362	. 043	. 723	. 085
42½	. 944	. 681	. 361	. 042	. 722	. 083
45	. 944	. 680	. 360	. 039	. 719	. 079
47½	. 943	. 679	. 358	. 037	. 717	. 075
48¾	. 943	. 679	. 358	. 036	. 715	. 073
50	2. 943	3. 678	7. 357	11. 035	14. 714	22. 071
52½	. 942	. 678	. 355	. 033	. 711	. 066
55	. 942	. 677	. 354	. 031	. 708	. 062
56¼	. 941	. 677	. 353	. 030	. 707	. 060
57½	. 941	. 676	. 353	. 029	. 705	. 058
15 00	2. 940	3. 676	7. 351	11. 027	14. 702	22. 054
02½	. 940	. 675	. 350	. 025	. 700	. 049
03¾	. 940	. 675	. 349	. 024	. 698	. 047
05	. 939	. 674	. 348	. 023	. 697	. 045
07½	. 939	. 673	. 347	. 020	. 694	. 041
10	2. 938	3. 673	7. 345	11. 018	14. 691	22. 036
11¼	. 938	. 672	. 345	. 017	. 689	. 034
12½	. 938	. 672	. 344	. 016	. 688	. 032
15	. 937	. 671	. 343	. 014	. 685	. 028
17½	. 936	. 671	. 341	. 012	. 682	. 023
18¾	. 936	. 670	. 340	. 011	. 681	. 021
20	2. 936	3. 670	7. 340	11. 009	14. 679	22. 019
22½	. 935	. 669	. 338	. 007	. 676	. 014
25	. 935	. 668	. 337	. 005	. 673	. 010
26¼	. 934	. 668	. 336	. 004	. 672	. 008
27½	. 934	. 668	. 335	. 003	. 670	. 006
30	2. 934	3. 667	7. 334	11. 001	14. 668	22. 001
32½	. 933	. 666	. 332	10. 999	. 665	21. 997
33¾	. 933	. 666	. 332	. 997	. 663	. 995
35	. 932	. 665	. 331	. 996	. 662	. 993
37½	. 932	. 665	. 329	. 994	. 659	. 988
40	2. 931	3. 664	7. 328	10. 992	14. 656	21. 984
41¼	. 931	. 664	. 327	. 991	. 654	. 981
42½	. 931	. 663	. 326	. 990	. 653	. 979
45	. 930	. 662	. 325	. 987	. 650	. 975
47½	. 929	. 662	. 323	. 985	. 647	. 970
48¾	. 929	. 661	. 322	. 984	. 645	. 968
50	2. 929	3. 661	7. 322	10. 983	14. 644	21. 966
52½	. 928	. 660	. 320	. 981	. 641	. 961
55	. 928	. 659	. 319	. 978	. 638	. 957
56¼	. 927	. 659	. 318	. 977	. 636	. 954
57½	. 927	. 659	. 317	. 976	. 635	. 952
16 00	2. 926	3. 658	7. 316	10. 974	14. 632	21. 948

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 14°	1¼	3. 781	0. 000
	2½	7, 562	. 001
	3¾	11, 343	. 002
	5	15, 124	. 003
	6¼	18. 905	. 004
	7½	22. 686	. 006
	10	30. 247	. 010
	12½	37. 809	. 016
	15	45. 371	. 023
For latitude 15°	1¼	3. 781	0. 000
	2½	7. 562	. 001
	3¾	11. 344	. 002
	5	15. 125	. 003
	6¼	18. 906	. 005
	7½	22. 687	. 006
	10	30. 250	. 011
	12½	37. 813	. 017
	15	45. 375	. 025
For latitude 16°	1¼	3. 781	0. 000
	2½	7. 563	. 001
	3¾	11. 345	. 002
	5	15. 126	. 003
	6¼	18. 908	. 005
	7½	22. 690	. 007
	10	30. 253	. 012
	12½	37. 816	. 018
	15	45. 379	. 026

TABLE 4.—*Coordinates for the projection of maps, scale* $\frac{1}{24000}$—Continued

Latitude of parallel		Abscissas of developed parallel					
		Longitude interval					
		1′	1¼′	2½′	3¾′	5′	7½′
°	′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
16	00	2.926	3.658	7.316	10.974	14.632	21.948
	02½	.926	.657	.314	.972	.629	.943
	03¾	.925	.657	.314	.970	.627	.941
	05	.925	.656	.313	.969	.626	.938
	07½	.925	.656	.311	.967	.623	.934
	10	2.924	3.655	7.310	10.965	14.620	21.929
	11¼	.924	.655	.309	.964	.618	.927
	12½	.923	.654	.308	.962	.617	.925
	15	.922	.653	.307	.960	.614	.920
	17½	.922	.653	.305	.958	.610	.916
	18¾	.921	.652	.304	.957	.609	.913
	20	2.921	3.652	7.304	10.955	14.607	21.911
	22½	.921	.651	.302	.953	.604	.907
	25	.920	.650	.300	.951	.601	.901
	26¼	.920	.650	.300	.950	.599	.899
	27½	.920	.649	.299	.948	.598	.897
	30	2.919	3.649	7.297	10.946	14.595	21.892
	32½	.918	.648	.296	.944	.592	.888
	33¾	.918	.648	.295	.943	.590	.885
	35	.918	.647	.294	.941	.589	.883
	37½	.917	.646	.293	.939	.585	.878
	40	2.916	3.646	7.291	10.937	14.582	21.874
	41¼	.916	.645	.290	.936	.581	.871
	42½	.916	.645	.290	.934	.579	.869
	45	.915	.644	.288	.932	.576	.864
	47½	.915	.643	.286	.930	.573	.859
	48¾	.914	.643	.286	.928	.571	.857
	50	2.914	3.642	7.285	10.927	14.570	21.855
	52½	.913	.642	.283	.925	.566	.850
	55	.913	.641	.282	.922	.563	.845
	56¼	.912	.640	.281	.921	.562	.842
	57½	.912	.640	.280	.920	.560	.840
17	00	2.911	3.639	7.278	10.918	14.557	21.835
	02½	.911	.638	.277	.915	.554	.830
	03¾	.910	.638	.276	.914	.552	.828
	05	.910	.638	.275	.913	.550	.826
	07½	.909	.637	.274	.910	.547	.821
	10	2.909	3.636	7.272	10.908	14.544	21.816
	11¼	.908	.636	.271	.907	.542	.813
	12½	.908	.635	.270	.906	.541	.811
	15	.907	.634	.269	.903	.537	.806
	17½	.907	.634	.267	.901	.534	.801
	18¾	.906	.633	.266	.899	.532	.799
	20	2.906	3.633	7.265	10.898	14.531	21.796
	22½	.905	.632	.264	.896	.528	.791
	25	.905	.631	.262	.893	.524	.786
	26¼	.904	.631	.261	.892	.523	.784
	27½	.904	.630	.260	.891	.521	.781
	30	2.904	3.629	7.259	10.888	14.518	21.777
	32½	.903	.629	.257	.886	.514	.772
	33¾	.903	.628	.256	.884	.513	.769
	35	.902	.628	.255	.883	.511	.766
	37½	.902	.627	.254	.881	.508	.762
	40	2.901	3.626	7.252	10.878	14.504	21.757
	41¼	.901	.626	.251	.877	.503	.754
	42½	.900	.625	.251	.876	.501	.752
	45	.900	.624	.249	.873	.498	.747
	47½	.899	.624	.247	.871	.494	.741
	48¾	.899	.623	.246	.869	.493	.739
	50	2.898	3.623	7.245	10.868	14.491	21.736
	52½	.898	.622	.244	.866	.488	.731
	55	.897	.621	.242	.863	.484	.726
	56¼	.896	.621	.241	.862	.483	.724
	57½	.896	.620	.240	.861	.481	.721
18	00	2.895	3.619	7.239	10.858	14.477	21.716

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 16°	1¼	3.781	0.000
	2½	7.563	.001
	3¾	11.345	.002
	5	15.126	.003
	6¼	18.908	.005
	7½	22.690	.007
	10	30.253	.012
	12½	37.816	.018
	15	45.379	.026
For latitude 17°	1¼	3.782	0.000
	2½	7.564	.001
	3¾	11.346	.002
	5	15.128	.003
	6¼	18.910	.005
	7½	22.692	.007
	10	30.256	.012
	12½	37.820	.019
	15	45.384	.028
For latitude 18°	1¼	3.782	0.000
	2½	7.565	.001
	3¾	11.347	.002
	5	15.129	.003
	6¼	18.912	.005
	7½	22.694	.007
	10	30.259	.013
	12½	37.824	.020
	15	45.388	.029

TABLE 4.—*Coordinates for the projection of maps, scale $\frac{1}{24000}$*—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
18 00	2.895	3.619	7.239	10.858	14.477	21.716
02½	.895	.618	.237	.855	.474	.711
03¾	.894	.618	.236	.854	.472	.708
05	.894	.618	.235	.853	.471	.706
07½	.893	.617	.234	.850	.467	.701
10	2.893	3.616	7.232	10.848	14.464	21.696
11¼	.892	.616	.231	847	.462	.693
12½	.892	.615	.230	.845	.460	.690
15	.891	.614	.228	.843	.457	.685
17½	.891	.613	.227	.840	.453	.680
18¾	.890	.613	.226	.839	.452	.678
20	2.890	3.612	7.225	10.837	14.450	21.675
22½	.889	.612	.223	.835	.447	.670
25	.889	.611	.222	.832	.443	.665
26¼	.888	.610	.221	.831	.441	.662
27½	.888	.610	.220	.830	.440	.659
30	2.887	3.609	7.218	10.827	14.436	21.654
32½	.887	.608	.216	.824	.433	.649
33¾	.886	.608	.215	.823	.431	.646
35	.886	.607	.215	.822	.429	.644
37½	.885	.606	.213	.819	.426	.638
40	2.884	3.606	7.211	10.817	14.422	21.633
41¼	.884	.605	.210	815	.420	.629
42½	.884	.605	.209	.814	.419	.628
45	.883	.604	.208	.811	.415	.623
47½	.882	.603	.206	.809	.411	.617
48¾	.882	.602	.205	.807	.410	.615
50	2.882	3.602	7.204	10.806	14.408	21.612
52½	.881	.601	.202	.803	.404	.607
55	.880	.600	.200	.801	.401	.601
56¼	.880	.600	.199	.799	.399	.598
57½	.879	.599	.199	.798	.397	.596
19 00	2.879	3.598	7.197	10.795	14.394	21.591
02½	.878	.598	.195	.793	.390	.585
03¾	.878	.597	.194	.791	.388	.582
05	.877	.597	.193	.790	.386	.580
07½	.877	.596	.191	.787	.383	.574
10	2.876	3.595	7.190	10.784	14.379	21.569
11¼	.875	.594	.189	.783	.377	.566
12½	.875	.594	.188	.782	.376	.563
15	.874	.593	.186	.779	.372	.558
17½	.874	.592	.184	.776	.368	.553
18¾	.873	.592	.183	.775	.367	.550
20	2.873	3.591	7.182	10.774	14.365	21.547
22½	.872	.590	.181	.771	.361	.542
25	.872	.589	.179	.768	.357	.536
26¼	.871	.589	.178	.766	.356	.533
27½	.871	.588	.177	.765	.354	.531
30	2.870	3.588	7.175	10.763	14.350	21.525
32½	.869	.587	.173	.760	.346	.520
33¾	.869	.586	.172	.758	.345	.517
35	.869	.586	.171	.757	.343	.514
37½	.868	.585	.169	.754	.339	.508
40	2.867	3.584	7.168	10.751	14.335	21.503
41¼	.867	.583	.167	.750	.333	.500
42½	.866	.583	.166	.749	.332	.497
45	.866	.582	.164	.746	.328	.492
47½	.865	.581	.162	.743	.324	.486
48¾	.865	.581	.161	.742	.322	.484
50	2.864	3.580	7.160	10.740	14.321	21.481
52½	.863	.579	.158	.738	.317	.475
55	.863	.578	.156	.735	.313	.469
56¼	.862	.578	.156	.733	.311	.467
57½	.862	.577	.155	.732	.309	.464
20 00	2.861	3.576	7.153	10.729	14.305	21.458

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 18°	1¼	3.782	0.000
	2½	7.565	.001
	3¾	11.347	.002
	5	15.129	.003
	6¼	18.912	.005
	7½	22.694	.007
	10	30.259	.013
	12½	37.824	.020
	15	45.388	.029
For latitude 19°	1¼	3.783	0.000
	2½	7.565	.001
	3¾	11.348	.002
	5	15.131	.003
	6¼	18.914	.005
	7½	22.697	.008
	10	30.262	.014
	12½	37.828	.021
	15	45.393	.031
For latitude 20°	1¼	3.783	0.000
	2½	7.566	.001
	3¾	11.350	.002
	5	15.133	.004
	6¼	18.916	.006
	7½	22.699	.008
	10	30.265	.014
	12½	37.832	.022
	15	45.398	.032

TABLE 4.—*Coordinates for the projection of maps, scale $\frac{1}{24000}$*—Continued

Latitude of parallel	Abscissas of developed parallel					
	Longitude interval					
	1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
20 00	2.861	3.576	7.153	10.729	14.305	21.458
02½	.860	.575	.151	.726	.302	.452
03¾	.860	.575	.150	.725	.300	.450
05	.860	.574	.149	.723	.298	.447
07½	.859	.574	.147	.721	.294	.441
10	2.858	3.573	7.145	10.718	14.290	21.436
11¼	.858	.572	.144	.716	.288	.433
12½	.857	.572	.143	.715	.287	.430
15	.857	.571	.141	.712	.283	.424
17½	.856	.570	.139	.709	.279	.418
18¾	.855	.569	.139	.708	.277	.416
20	2.855	3.569	7.138	10.706	14.275	21.413
22½	.854	.568	.136	.703	.271	.407
25	.853	.567	.134	.701	.267	.401
26¼	.853	.566	.133	.699	.265	.398
27½	.853	.566	.132	.698	.264	.395
30	2.852	3.565	7.130	10.695	14.260	21.390
32½	.851	.564	.128	.692	.256	.384
33¾	.851	.563	.127	.690	.254	.381
35	.850	.563	.126	.689	.252	.378
37½	.850	.562	.124	.686	.248	.372
40	2.849	3.561	7.122	10.683	14.244	21.366
41¼	.848	.561	.121	.682	.242	.363
42½	.848	.560	.120	.680	.240	.361
45	.847	.559	.118	.677	.237	.355
47½	.847	.558	.116	.674	.233	.349
48¾	.846	.558	.115	.673	.231	.346
50	2.846	3.557	7.114	10.672	14.229	21.343
52½	.845	.556	.112	.669	.225	.337
55	.844	.555	.110	.666	.221	.331
56¼	.844	.555	.110	.664	.219	.328
57½	.843	.554	.108	.663	.217	.325
21 00	2.843	3.553	7.106	10.660	14.213	21.319
02½	.842	.552	.004	.657	.209	.313
03¾	.841	.552	.104	.655	.207	.311
05	.841	.551	.103	.654	.205	.308
07½	.840	.550	.101	.651	.201	.302
10	2.839	3.549	7.099	10.648	14.197	21.296
11¼	.839	.549	.098	.646	.195	.294
12½	.839	.548	.097	.645	.193	.290
15	.838	.547	.095	.642	.189	.284
17½	.837	.546	.093	.639	.185	.278
18¾	.837	.546	.092	.637	.183	.275
20	2.836	3.545	7.091	10.636	14.181	21.272
22½	.835	.544	.089	.633	.177	.266
25	.835	.543	.087	.630	.173	.260
26¼	.834	.543	.086	.628	.171	.257
27½	.834	.542	.085	.627	.169	.254
30	2.833	3.541	7.083	10.624	14.165	21.248
32½	.832	.540	.081	.621	.161	.242
33¾	.832	.540	.080	.619	.159	.239
35	.831	.539	.078	.618	.157	.235
37½	.831	.538	.076	.615	.153	.229
40	2.830	3.537	7.074	10.612	14.149	21.223
41¼	.829	.537	.073	.610	.147	.220
42½	.829	.536	.072	.609	.145	217
45	.828	.535	.070	.606	.141	.211
47½	.827	.534	.068	.602	.137	.205
48¾	.827	.534	.067	.601	.135	.202
50	2.827	3.533	7.066	10.599	14.133	21.199
52½	.826	.532	.064	.596	.128	.193
55	.825	.531	.062	.593	.124	.187
56¼	.825	.531	.061	.592	.122	.183
57½	.824	.530	.060	.590	.120	.180
22 00	2.823	3.529	7.058	10.587	14.116	21.174

Ordinates of developed parallel and meridional distances			
Latitude and longitude interval		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 20°	1¼	3.783	0.000
	2½	7.566	.001
	3¾	11.350	.002
	5	15.133	.004
	6¼	18.916	.006
	7½	22.699	.008
	10	30.265	.014
	12½	37.832	.022
	15	45.398	.032
For latitude 21°	1¼	3.784	0.000
	2½	7.567	.001
	3¾	11.351	.002
	5	15.134	.004
	6¼	18.918	.006
	7½	22.702	.008
	10	30.269	.015
	12½	37.837	.023
	15	45.403	.033
For latitude 22°	1¼	3.784	0.000
	2½	7.568	.001
	3¾	11.352	.002
	5	15.136	.004
	6¼	18.921	.006
	7½	22.705	.009
	10	30.272	.015
	12½	37.841	.024
	15	45.409	.035

TABLE 4.—*Coordinates for the projection of maps, scale* $\frac{1}{24000}$—Continued

Latitude of parallel	Abscissas of developed parallel: Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
22 00	2.823	3.529	7.058	10.587	14.116	21.174
02½	.822	.528	.056	.584	.112	.168
03¾	.822	.527	.055	.582	.110	.165
05	.822	.527	.054	.581	.108	.162
07½	.821	.526	.052	.578	.104	.156
10	2.820	3.525	7.050	10.575	14.100	21.149
11¼	.819	.524	.049	.573	.097	.146
12½	.819	.524	.048	.572	.095	.143
15	.818	.523	.046	.568	.091	.137
17½	.817	.522	.044	.565	.087	.131
18¾	.817	.521	.043	.564	.085	.128
20	2.817	3.521	7.041	10.562	14.083	21.124
22½	.816	.520	.039	.559	.079	.118
25	.815	.519	.037	.556	.074	.112
26¼	.815	.518	.036	.554	.072	.109
27½	.814	.518	.035	.553	.070	.105
30	2.813	3.517	7.033	10.550	14.066	21.099
32½	.812	.515	.031	.546	.062	.093
33¾	.812	.515	.030	.545	.060	.090
35	.811	.514	.029	.543	.058	.087
37½	.811	.513	.027	.540	.053	.080
40	2.810	3.512	7.025	10.537	14.049	21.074
41¼	.809	.512	.024	.535	.047	.071
42½	.809	.511	.022	.534	.045	.067
45	.808	.510	.020	.530	.041	.061
47½	.807	.509	.019	.527	.036	.055
48¾	.807	.509	.017	.526	.034	.051
50	2.806	3.508	7.016	10.524	14.032	21.048
52½	.806	.507	.014	.521	.028	.042
55	.805	.506	.012	.518	.024	.035
56¼	.804	.505	.011	.516	.021	.032
57½	.804	.505	.010	.515	.019	.029
23 00	2.803	3.504	7.008	10.511	14.015	21.023
02½	.802	.503	.005	.508	.011	.016
03¾	.802	.502	.004	.506	.009	.013
05	.801	.502	.003	.505	.006	.010
07½	.800	.501	.001	.502	.002	.003
10	2.800	3.499	6.999	10.498	13.998	20.997
11¼	.799	.499	.998	.497	.996	.994
12½	.799	.498	.997	.495	.994	.990
15	.798	.497	.995	.492	.989	.984
17½	.797	.496	.992	.489	.985	.977
18¾	.797	.496	.991	.487	.983	.974
20	2.796	3.495	6.990	10.485	13.980	20.971
22½	.795	.494	.988	.482	.976	.964
25	.794	.493	.986	.479	.972	.957
26¼	.794	.492	.985	.477	.969	.954
27½	.793	.492	.984	.475	.967	.951
30	2.793	3.491	6.981	10.472	13.963	20.944
32½	.792	.490	.979	.469	.958	.938
33¾	.791	.489	.978	.467	.956	.934
35	.791	.489	.977	.466	.954	.931
37½	.790	.487	.975	.462	.950	.925
40	2.789	3.486	6.973	10.459	13.945	20.918
41¼	.789	.486	.972	.457	.943	.915
42½	.788	.485	.970	456	.941	.911
45	.787	.484	.968	.452	.937	.905
47½	.786	.483	.966	.449	.932	.898
48¾	.786	.482	.965	.447	.930	.895
50	2.786	3.482	6.964	10.446	13.928	20.891
52½	.785	.481	.962	.442	.923	.885
55	.784	.480	.959	.439	.919	.878
56¼	.783	.479	.958	.437	.916	.875
57½	.783	.479	.957	.436	.914	.871
24 00	2.782	3.477	6.955	10.432	13.910	20.865

Ordinates of developed parallel and meridional distances

Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 22°	1¼	3.784	0.000
	2½	7.568	.001
	3¾	11.352	.002
	5	15.136	.004
	6¼	18.921	.006
	7½	22.705	.009
	10	30.272	.015
	12½	37.841	.024
	15	45.409	.035
For latitude 23°	1¼	3.784	0.000
	2½	7.569	.001
	3¾	11.354	.002
	5	15.138	.004
	6¼	18.923	.006
	7½	22.707	.009
	10	30.276	.016
	12½	37.846	.025
	15	45.415	.036
For latitude 24°	1¼	3.785	0.000
	2½	7.570	.001
	3¾	11.355	.002
	5	15.140	.004
	6¼	18.925	.006
	7½	22.710	.009
	10	30.280	.016
	12½	37.851	.026
	15	45.421	.037

TABLE 4.—*Coordinates for the projection of maps, scale* $\frac{1}{24000}$—Continued

Latitude of parallel		Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
°	′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
24	00	2.782	3.477	6.955	10.432	13.910	20.865
	02½	.781	.476	.953	.429	.905	.858
	03¾	.781	.476	.952	.427	.903	.855
	05	.780	.475	.950	.426	.901	.851
	07½	.779	.474	.948	.422	.896	.844
	10	2.778	3.473	6.946	10.419	13.892	20.838
	11¼	.778	.472	.945	.417	.889	.834
	12½	.777	.472	.944	.415	.887	.831
	15	.777	.471	.941	.412	.883	.824
	17½	.776	.470	.939	.409	.878	.817
	18¾	.775	.469	.938	.407	.876	.814
	20	2.775	3.468	6.937	10.405	13.874	20.811
	22½	.774	.467	.935	.402	.869	.804
	25	.773	.466	.932	.398	.864	.797
	26¼	.772	.466	.931	.397	.862	.793
	27½	.772	.465	.930	.395	.860	.790
	30	2.771	3.464	6.928	10.392	13.855	20.783
	32½	.770	.463	.925	.388	.851	.776
	33¾	.770	.462	.924	.386	.849	.773
	35	.769	.462	.923	.385	.846	.769
	37½	.768	.460	.921	.381	.842	.763
	40	2.767	3.459	6.919	10.378	13.837	20.756
	41¼	.767	.459	.917	.376	.835	.752
	42½	.766	.458	.916	.374	.833	.749
	45	.766	.457	.914	.371	.828	.742
	47½	.765	.456	.912	.367	.823	.735
	48¾	.764	.455	.911	.366	.821	.732
	50	2.764	3.455	6.909	10.364	13.819	20.728
	52½	.763	.454	.907	.361	.814	.721
	55	.762	.452	.905	.357	.809	.714
	56¼	.761	.452	.904	.355	.807	.711
	57½	.761	.451	.902	.354	.805	.707
25	00	2.760	3.450	6.900	10.350	13.800	20.700
	02½	.759	.449	.898	.347	.796	.693
	03¾	.759	.448	.897	.345	.793	.690
	05	.758	.448	.895	.343	.791	.686
	07½	.757	.447	.893	.340	.786	.679
	10	2.756	3.445	6.891	10.336	13.781	20.672
	11¼	.756	.445	.890	.334	.779	.669
	12½	.755	.444	.888	.333	.777	.665
	15	.754	.443	.886	.329	.772	.658
	17½	.753	.442	.884	.325	.767	.651
	18¾	.753	.441	.882	.324	.765	.647
	20	2.753	3.441	6.881	10.322	13.763	20.644
	22½	.752	.439	.879	.318	.758	.637
	25	.751	.438	.877	.315	.753	.630
	26¼	.750	.438	.875	.313	.751	.626
	27½	.750	.437	.874	.311	.748	.623
	30	2.749	3.436	6.872	10.308	13.744	20.616
	32½	.748	.435	.870	.304	.739	.609
	33¾	.747	.434	.868	.302	.737	.605
	35	.747	.434	.867	.301	734	.601
	37½	.746	.432	.865	.297	.729	.594
	40	2.745	3.431	6.862	10.294	13.725	20.587
	41¼	.744	.431	.861	.292	.722	.583
	42½	.744	.430	.860	.290	.720	.580
	45	.743	.429	.858	.286	.715	.573
	47½	.742	.428	.855	.283	.710	.565
	48¾	.742	.427	.854	.281	.708	.562
	50	2.741	3.426	6.853	10.279	13.706	20.558
	52½	.740	.425	.850	.276	.701	.551
	55	.739	.424	.848	.272	.696	.544
	56¼	.739	.423	.847	.270	.694	.540
	57½	.738	.423	.846	.268	.691	.537
26	00	2.737	3.422	6.843	10.265	13.686	20.530

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals	′	Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 24°	1¼	3.785	0.000
	2½	7.570	.001
	3¾	11.355	.002
	5	15.140	.004
	6¼	18.925	.006
	7½	22.710	.009
	10	30.280	.016
	12½	37.851	.026
	15	45.421	.037
For latitude 25°	1¼	3.786	0.000
	2½	7.571	.001
	3¾	11.357	.002
	5	15.142	.004
	6¼	18.928	.007
	7½	22.713	.010
	10	30.284	.017
	12½	37.856	.026
	15	45.426	.038
For latitude 26°	1¼	3.786	0.000
	2½	7.572	.001
	3¾	11.358	.002
	5	15.144	.004
	6¼	18.931	.007
	7½	22.717	.010
	10	30.289	.017
	12½	37.861	.027
	15	45.433	.039

TABLE 4.—*Coordinates for the projection of maps, scale* $\frac{1}{24000}$—Continued

Latitude of parallel		Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
°	′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
26	00	2.737	3.422	6.843	10.265	13.686	20.530
	02½	.736	.420	.841	.261	.682	.522
	03¾	.736	.420	.840	.259	.679	.519
	05	.735	.419	.838	.258	.677	.515
	07½	.734	.418	.836	.256	.672	.508
	10	2.733	3.417	6.833	10.250	13.667	20.500
	11¼	.733	.416	.832	.248	.665	.497
	12½	.732	.416	.831	.247	.662	.493
	15	.731	.414	.829	.243	.657	.486
	17½	.730	.413	.826	.239	.652	.478
	18¾	.730	.412	.825	.237	.650	.475
	20	2.729	3.412	6.824	10.236	13.647	20.471
	22½	.728	.411	.821	.232	.643	.464
	25	.727	.409	.819	.228	.638	.456
	26¼	.727	.409	.818	.226	.635	.453
	27½	.727	.408	.816	.225	.633	.449
	30	2.726	3.407	6.814	10.221	13.628	20.442
	32½	.725	.406	.811	.217	.623	.434
	33¾	.724	.405	.810	.215	.620	.431
	35	.724	.404	.809	.213	.618	.427
	37½	.723	.403	.807	.210	.613	.420
	40	2.722	3.402	6.804	10.206	13.608	20.412
	41¼	.721	.401	.803	.204	.606	.408
	42½	.721	.401	.802	.202	.603	.405
	45	.720	.400	.799	.199	.598	.397
	47½	.719	.398	.797	.195	.593	.390
	48¾	.718	.398	.795	.193	.591	.386
	50	2.718	3.397	6.794	10.191	13.588	20.383
	52½	.717	.396	.792	.188	.583	.375
	55	.716	.395	.789	.184	.578	.368
	56¼	.715	.394	.788	.182	.576	.364
	57½	.715	.393	.787	.180	.573	.360
27	00	2.714	3.392	6.784	10.176	13.568	20.353
	02½	.713	.391	.782	.173	.563	.345
	03¾	.712	.390	.780	.171	.561	.341
	05	.712	.390	.779	.169	.558	.338
	07½	.711	.388	.777	.165	.553	.330
	10	2.710	3.387	6.774	10.161	13.548	20.323
	11¼	.709	.386	.773	.159	.546	.319
	12½	.709	.386	.772	.157	.543	.315
	15	.708	.384	.769	.154	.538	.307
	17½	.707	.383	.767	.150	.533	.300
	18¾	.706	.383	.765	.148	.531	.296
	20	2.706	3.382	6.764	10.146	13.528	20.292
	22½	.705	.381	.762	.142	.523	.285
	25	.704	.380	.759	.139	.518	.277
	26¼	.703	.379	.758	.137	.516	273
	27½	.703	.378	.756	.135	.513	.269
	30	2.702	3.377	6.754	10.131	13.508	20.262
	32½	.701	.376	.751	.127	.503	.254
	33¾	.700	.375	.750	.125	.500	.250
	35	.700	.374	.749	.123	.498	.247
	37½	.699	.373	.746	.119	.493	.239
	40	2.697	3.372	6.744	10.116	13.488	20.231
	41¼	.697	.371	.742	.114	.485	.227
	42½	.696	.371	.741	.112	.482	.224
	45	.696	.369	.739	.108	.477	.216
	47½	.694	.368	.736	.104	.472	.208
	48¾	.694	.367	.735	.102	.470	.204
	50	2.693	3.367	6.734	10.100	13.467	20.201
	52½	.692	.365	.731	.096	.462	.193
	55	.691	.364	.728	.093	.457	.185
	56¼	.691	.364	.727	.091	.454	.181
	57½	.690	.363	.726	.089	.452	.177
28	00	2.689	3.362	6.723	10.085	13.446	20.170

Ordinates of developed parallel and meridional distances

Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 26°	1¼	3.786	0.000
	2½	7.572	.001
	3¾	11.358	.002
	5	15.144	.004
	6¼	18.931	.007
	7½	22.717	.010
	10	30.289	.017
	12½	37.861	.027
	15	45.433	.039
For latitude 27°	1¼	3.787	0.000
	2½	7.573	.001
	3¾	11.360	.003
	5	15.146	.004
	6¼	18.933	.007
	7½	22.720	.010
	10	30.293	.018
	12½	37.867	.028
	15	45.439	.040
For latitude 28°	1¼	3.787	0.000
	2½	7.574	.001
	3¾	11.362	.003
	5	15.148	.005
	6¼	18.936	.007
	7½	22.723	.010
	10	30.297	.018
	12½	37.872	.029
	15	45.446	.041

TABLE 4.—*Coordinates for the projection of maps, scale* $\frac{1}{24000}$—Continued

Latitude of parallel		Abscissas of developed parallel					
		Longitude interval					
		1′	1¼′	2½′	3¾′	5′	7½′
°	′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
28	00	2.689	3.362	6.723	10.085	13.446	20.170
	02½	.688	.360	.721	.081	.441	.162
	03¾	.688	.360	.719	.079	.439	.158
	05	.687	.359	.718	.077	.436	.154
	07½	.686	.358	.715	.073	.431	.146
	10	2.685	3.356	6.713	10.069	13.426	20.138
	11¼	.685	.356	.711	.067	.423	.134
	12½	.684	.355	.710	.065	.420	.131
	15	.683	.354	.708	.061	.415	.123
	17½	.682	.353	.705	.057	.410	.115
	18¾	.681	.352	.704	.055	.407	.111
	20	2.681	3.351	6.702	10.054	13.405	20.107
	22½	.680	.350	.700	.050	.399	.099
	25	.679	.349	.697	.046	.394	.091
	26¼	.678	.348	.696	.044	.392	.086
	27½	.678	.347	.694	.042	.389	.083
	30	2.677	3.346	6.692	10.038	13.384	20.076
	32½	.676	.345	.689	.034	.378	.068
	33¾	.675	.344	.688	.032	.376	.064
	35	.675	.343	.687	.030	.373	.060
	37½	.674	.342	.684	.026	.368	.052
	40	2.673	3.341	6.681	10.022	13.363	20.044
	41¼	.672	.340	.680	.020	.360	.040
	42½	.671	.339	.679	.018	.357	.036
	45	.670	.338	.676	.014	.352	.028
	47½	.669	.337	.673	.010	.347	.020
	48¾	.669	.336	.672	.008	.344	.016
	50	2.668	3.335	6.671	10.006	13.342	20.012
	52½	.667	.334	.668	.002	.336	.004
	55	.666	.333	.665	9.998	.331	19.996
	56¼	.666	.332	.664	.996	.328	.992
	57½	.665	.331	.663	.994	.326	.988
29	00	2.664	3.330	6.660	9.990	13.320	19.980
	02½	.663	.329	.657	.986	.315	.972
	03¾	.662	.328	.656	.984	.312	.968
	05	.662	.327	.655	.982	.309	.964
	07½	.661	.326	.652	.978	.304	.956
	10	2.660	3.325	6.649	9.974	13.299	19.948
	11¼	.659	.324	.648	.972	.296	.944
	12½	.659	.323	.647	.970	.293	.940
	15	.658	.322	.644	.966	.288	.932
	17½	.657	.321	.641	.962	.283	.924
	18¾	.656	.320	.640	.960	.280	.920
	20	2.655	3.319	6.639	9.958	13.277	19.916
	22½	.654	.318	.636	.954	.272	.908
	25	.653	.317	.633	.950	.266	.900
	26¼	.653	.316	.632	.948	.264	.896
	27½	.652	.315	.630	.946	.261	.891
	30	2.651	3.314	6.628	9.942	13.256	19.883
	32½	.650	.313	.625	.938	.250	.875
	33¾	.649	.312	.624	.936	.247	.871
	35	.649	.311	.622	.933	.245	.867
	37½	.648	.310	.620	.929	.239	.859
	40	2.647	3.308	6.617	9.925	13.234	19.851
	41¼	.646	.308	.616	.923	.231	.847
	42½	.646	.307	.614	.921	.228	.842
	45	.644	.306	.611	.917	.223	.834
	47½	.643	.304	.609	.913	.217	.826
	48¾	.643	.304	.607	.911	.215	.822
	50	2.642	3.303	6.606	9.909	13.212	19.818
	52½	.641	.302	.603	.905	.206	.810
	55	.640	.300	.600	.901	.201	.801
	56¼	.640	.300	.599	.899	.198	.797
	57½	.639	.299	.598	.897	.195	.793
30	00	2.638	3.297	6.595	9.892	13.190	19.785

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 28°	1¼	3.787	0.000
	2½	7.574	.001
	3¾	11.362	.003
	5	15.148	.005
	6¼	18.936	.007
	7½	22.723	.010
	10	30.297	.018
	12½	37.872	.029
	15	45.446	.041
For latitude 29°	1¼	3.788	0.000
	2½	7.575	.001
	3¾	11.363	.003
	5	15.151	.005
	6¼	18.939	.007
	7½	22.726	.011
	0	30.302	.019
	12½	37.878	.029
	15	45.453	.042
For latitude 30°	1¼	3.788	0.000
	2½	7.577	.001
	3¾	11.365	.003
	5	15.153	.005
	6¼	18.942	.007
	7½	22.730	.011
	10	30.306	.019
	12½	37.884	.030
	15	45.460	.043

TABLE 4.—*Coordinates for the projection of maps, scale* $\frac{1}{24000}$—Continued

Latitude of parallel		Abscissas of developed parallel — Longitude interval					
		1′	1¼′	2½′	3¾′	5′	7½′
°	′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
30	00	2.638	3.297	6.595	9.892	13.190	19.785
	02½	.637	.296	.592	.888	.184	.777
	03¾	.636	.295	.591	.886	.182	.772
	05	.636	.295	.589	.884	.179	.768
	07½	.635	.293	.587	.880	.173	.760
	10	2.633	3.292	6.584	9.876	13.168	19.752
	11¼	.633	.291	.583	.874	.165	.748
	12½	.632	.291	.581	.872	.162	.743
	15	.631	.289	.578	.867	.157	.735
	17½	.630	.288	.576	.863	.151	.727
	18¾	.630	.287	.574	.861	.148	.723
	20	2.629	3.286	6.573	9.859	13.146	19.719
	22½	.628	.285	.570	.855	.140	.710
	25	.627	.284	.567	.851	.135	.702
	26¼	.626	.283	.566	.849	.132	.698
	27½	.626	.282	.564	.847	.129	.693
	30	2.625	3.281	6.562	9.843	13.123	19.685
	32½	.623	.279	.559	.838	.118	.677
	33¾	.623	.278	.557	.836	.115	.672
	35	.622	.278	.556	.834	.112	.668
	37½	.621	.277	.553	.830	.106	.660
	40	2.620	3.275	6.550	9.826	13.101	19.651
	41¼	.620	.275	.549	.824	.098	.647
	42½	.619	.274	.548	.821	.095	.643
	45	.618	.272	.545	.817	.090	.634
	47½	.617	.271	.542	.813	.084	.626
	48¾	.616	.270	.541	.811	.081	.622
	50	2.616	3.270	6.539	9.809	13.078	19.618
	52½	.615	.268	.536	.805	.073	.609
	55	.613	.267	.534	.800	.067	.601
	56¼	.613	.266	.532	.798	.064	.596
	57½	.612	.265	.531	.796	.061	.592
31	00	2.611	3.264	6.528	9.792	13.056	19.584
	02½	.610	.263	.525	.788	.050	.575
	03¾	.609	.262	.524	.785	.047	.571
	05	.609	.261	.522	.783	.044	.566
	07½	.608	.260	.519	.779	.039	.558
	10	2.607	3.258	6.516	9.775	13.033	19.549
	11¼	.606	.258	.515	.773	.030	.545
	12½	.605	.257	.514	.770	.027	.541
	15	.604	.255	.511	.766	.021	.532
	17½	.603	.254	.508	.762	.016	.524
	18¾	.603	.253	.506	.760	.013	.519
	20	2.602	3.253	6.505	9.757	13.010	19.515
	22½	.601	.251	.502	.753	.004	.506
	25	.600	.250	.499	.749	12.999	.498
	26¼	.599	.249	.498	.747	.996	.493
	27½	.599	.248	.496	.745	.993	.489
	30	2.597	3.247	6.494	9.740	12.987	19.481
	32½	.596	.245	.491	.736	.981	.472
	33¾	.596	.245	.489	.734	.978	.468
	35	.595	.244	.488	.732	.976	.463
	37½	.594	.242	.485	.727	.970	.455
	40	2.593	3.241	6.482	9.723	12.964	19.446
	41¼	.592	.240	.481	.721	.961	.442
	42½	.592	.240	.479	.719	.958	.437
	45	.591	.238	.476	.714	.952	.429
	47½	.589	.237	.473	.710	.947	.420
	48¾	.589	.236	.472	.708	.944	.416
	50	2.588	3.235	6.470	9.706	12.941	19.411
	52½	.587	.234	.467	.701	.935	.402
	55	.586	.232	.465	.697	.929	.394
	56¼	.585	.232	.463	.695	.926	.389
	57½	.585	.231	.462	.693	.923	.385
32	00	2.583	3.229	6.459	9.688	12.917	19.376

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 30°	1¼	3.788	0.000
	2½	7.577	.001
	3¾	11.365	.003
	5	15.153	.005
	6¼	18.942	.007
	7½	22.730	.011
	10	30.306	.019
	12½	37.884	.030
	15	45.460	.043
For latitude 31°	1¼	3.789	0.000
	2½	7.578	.001
	3¾	11.367	.003
	5	15.155	.005
	6¼	18.945	.008
	7½	22.733	.011
	10	30.311	.020
	12½	37.890	.031
	15	45.467	.044
For latitude 32°	1¼	3.789	0.000
	2½	7.579	.001
	3¾	11.369	.003
	5	15.158	.005
	6¼	18.948	.008
	7½	22.737	.011
	10	30.316	.020
	12½	37.896	.031
	15	45.474	.045

TABLE 4.—*Coordinates for the projection of maps, scale* $\frac{1}{24000}$—Continued

Latitude of parallel		Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
°	′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
32	00	2.583	3.229	6.459	9.688	12.917	19.376
	02½	.582	.228	.456	.684	.912	.367
	03¾	.582	.227	.454	.681	.909	.363
	05	.581	.226	.453	.679	.906	.359
	07½	.580	.225	.450	.675	.900	.351
	10	2.579	3.224	6.447	9.671	12.894	19.341
	11¼	.578	.223	.445	.668	.891	.337
	12½	.578	.222	.444	.666	.888	.332
	15	.576	.221	.441	.662	.882	.323
	17½	.575	.219	.438	.657	.876	.315
	18¾	.575	.218	.437	.655	.873	.310
	20	2.574	3.218	6.435	9.653	12.871	19.306
	22½	.573	.216	.432	.649	.865	.297
	25	.572	.215	.429	.644	.859	.288
	26¼	.571	.214	.428	.642	.856	.284
	27½	.571	.213	.426	.640	.853	.279
	30	2.569	3.212	6.423	9.635	12.847	19.270
	32½	.568	.210	.420	.631	.841	.261
	33¾	.568	.209	.419	.628	.838	.257
	35	.567	.209	.417	.626	.835	.252
	37½	.566	.207	.415	.622	.829	.244
	40	2.565	3.206	6.412	9.617	12.823	19.235
	41¼	.564	.205	.410	.615	.820	.230
	42½	.562	.204	.409	.613	.817	.226
	45	.562	.203	.406	.608	.811	.217
	47½	.561	.201	.403	.604	.805	.208
	48¾	.560	.201	.401	.602	.802	.203
	50	2.560	3.200	6.400	9.599	12.799	19.199
	52½	.559	.198	.397	.595	.793	.190
	55	.557	.197	.394	.590	.787	.181
	56¼	.557	.196	.392	.588	.784	.176
	57½	.556	.195	.391	.586	.781	.172
33	00	2.555	3.194	6.388	9.581	12.775	19.163
	02½	.554	.192	.385	.577	.769	.154
	03¾	.553	.192	.383	.575	.766	.149
	05	.553	.191	.382	.572	.763	.145
	07½	.551	.189	.379	.568	.757	.136
	10	2.550	3.188	6.376	9.563	12.751	19.127
	11¼	.550	.187	.374	.561	.748	.122
	12½	.549	.186	.373	.559	.745	.118
	15	.548	.185	.370	.554	.739	.109
	17½	.547	.183	.367	.550	.733	.100
	18¾	.546	.183	.365	.548	.730	.095
	20	2.545	3.182	6.364	9.545	12.727	19.091
	22½	.544	.180	.360	.541	.721	.081
	25	.543	.179	.357	.536	.715	.072
	26¼	.542	.178	.356	.534	.712	.068
	27½	.542	.177	.354	.532	.709	.063
	30	2.540	3.176	6.351	9.527	12.703	19.054
	32½	.539	.174	.348	.523	.697	.045
	33¾	.539	.173	.347	.520	.694	.040
	35	.538	.173	.345	.518	.691	.036
	37½	.537	.171	.342	.513	.684	.027
	40	2.536	3.170	6.339	9.509	12.678	19.017
	41¼	.535	.169	.338	.506	.675	.013
	42½	.535	.168	.336	.504	.672	.008
	45	.533	.167	.333	.500	.666	18.999
	47½	.532	.165	.330	.495	.660	.990
	48¾	.531	.164	.328	.493	.657	.985
	50	2.531	3.163	6.327	9.490	12.654	18.981
	52½	.530	.162	.324	.486	.648	.972
	55	.528	.160	.321	.481	.642	.962
	56¼	.528	.160	.319	.479	.638	.958
	57½	.527	.159	.318	.477	.635	.953
34	00	2.526	3.157	6.315	9.472	12.629	18.944

Ordinates of developed parallel and meridional distances

Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 32°	1¼	3.789	0.000
	2½	7.579	.001
	3¾	11.369	.003
	5	15.158	.005
	6¼	18.948	.008
	7½	22.737	.011
	10	30.316	.020
	12½	37.896	.031
	15	45.474	.045
For latitude 33°	1¼	3.790	0.000
	2½	7.580	.001
	3¾	11.370	.003
	5	15.160	.005
	6¼	18.951	.008
	7½	22.741	.011
	10	30.321	.020
	12½	37.902	.032
	15	45.481	.046
For latitude 34°	1¼	3.791	0.000
	2½	7.581	.001
	3¾	11.372	.003
	5	15.162	.005
	6¼	18.954	.008
	7½	22.744	.011
	10	30.326	.021
	12½	37.908	.032
	15	45.489	.046

TABLE 4.—*Coordinates for the projection of maps, scale* $\frac{1}{24000}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
34 00	2.526	3.157	6.315	9.472	12.629	18.944
02½	.525	.156	.312	.467	.623	.935
03¾	.524	.155	.310	.465	.620	.930
05	.523	.154	.308	.463	.617	.925
07½	.522	.153	.305	.458	.611	.916
10	2.521	3.151	6.302	9.453	12.605	18.907
11¼	.520	.150	.301	.451	.601	.902
12½	.520	.150	.299	.449	.598	.898
15	.519	.148	.296	.444	.592	.888
17½	.517	.146	.293	.439	.586	.879
18¾	.517	.146	.291	.437	.583	.874
20	2.516	3.145	6.290	9.435	12.580	18.870
22½	.515	.143	.287	.430	.574	.860
25	.513	.142	.284	.425	.567	.851
26¼	.513	.141	.282	.423	.564	.846
27½	.512	.140	.281	.421	.561	.842
30	2.511	3.139	6.277	9.416	12.555	18.832
32½	.510	.137	.274	.411	.549	.823
33¾	.509	.136	.273	.409	.545	.818
35	.508	.136	.271	.407	.542	.814
37½	.507	.134	.268	.402	.536	.804
40	2.506	3.132	6.265	9.397	12.530	18.795
41¼	.505	.132	.263	.395	.527	.790
42½	.505	.131	.262	.393	.523	.785
45	.503	.129	.259	.388	.517	.776
47½	.502	.128	.255	.383	.511	.766
48¾	.502	.127	.254	.381	.508	.762
50	2.501	3.126	6.252	9.378	12.505	18.757
52½	.500	.125	.249	.374	.498	.747
55	.498	.123	.246	.369	.492	.738
56¼	.498	.122	.244	.367	.489	.733
57½	.497	.121	.243	.364	.486	.728
35 00	2.496	3.120	6.240	9.359	12.479	18.719
02½	.495	.118	.237	.355	.473	.710
03¾	.494	.117	.235	.352	.470	.705
05	.493	.117	.233	.350	.467	.700
07½	.492	.115	.230	.345	.460	.691
10	2.491	3.113	6.227	9.341	12.454	18.681
11¼	.490	.113	.225	.338	.451	.676
12½	.490	.112	.224	.336	.448	.672
15	.488	.110	.221	.331	.441	.662
17½	.487	.109	.217	.326	.435	.652
18¾	.486	.108	.216	.324	.432	.648
20	2.486	3.107	6.214	9.321	12.428	18.643
22½	.484	.106	.211	.317	.422	.633
25	.483	.104	.208	.312	.416	.624
26¼	.482	.103	.206	.309	.413	.619
27½	.482	.102	.205	.307	.409	.614
30	2.481	3.101	6.202	9.302	12.403	18.605
32½	.479	.099	.198	.297	.397	.595
33¾	.479	.098	.197	.295	.393	.590
35	.478	.098	.195	.293	.390	.585
37½	.477	.096	.192	.288	.384	.576
40	2.476	3.094	6.189	9.283	12.377	18.566
41¼	.475	.093	.187	.281	.374	.561
42½	.474	.093	.185	.278	.371	.556
45	.473	.091	.182	.273	.364	.547
47½	.472	.089	.179	.268	.358	.537
48¾	.471	.089	.177	.266	.355	.532
50	2.470	3.088	6.176	9.264	12.352	18.527
52½	.469	.086	.172	.259	.345	.518
55	.468	.085	.169	.254	.339	.508
56¼	.467	.084	.168	.252	.335	.503
57½	.466	.083	.166	.249	.332	.498
36 00	2.465	3.081	6.163	9.244	12.326	18.488

Ordinates of developed parallel and meridional distances

Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 34°	1¼	3.791	0.000
	2½	7.581	.001
	3¾	11.372	.003
	5	15.162	.005
	6¼	18.954	.008
	7½	22.744	.011
	10	30.326	.021
	12½	37.908	.032
	15	45.489	.046
For latitude 35°	1¼	3.791	0.000
	2½	7.583	.001
	3¾	11.374	.003
	5	15.165	.005
	6¼	18.957	.008
	7½	22.748	.012
	10	30.331	.021
	12½	37.914	.033
	15	45.496	.047
For latitude 36°	1¼	3.792	0.000
	2½	7.584	.001
	3¾	11.376	.003
	5	15.168	.005
	6¼	18.960	.008
	7½	22.752	.012
	10	30.336	.021
	12½	37.921	.033
	15	45.504	.047

TABLE 4.—*Coordinates for the projection of maps, scale* $\frac{1}{24000}$—Continued

Latitude of parallel		Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
°	′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
36	00	2. 465	3. 081	6. 163	9. 244	12. 326	18. 488
	02½	. 464	. 080	. 160	. 239	. 319	. 479
	03¾	. 463	. 079	. 158	. 237	. 316	. 474
	05	. 463	. 078	. 156	. 234	. 313	. 469
	07½	. 461	. 077	. 153	. 230	. 306	. 459
	10	2. 460	3. 075	6. 150	9. 225	12. 300	18. 450
	11¼	. 459	. 074	. 148	. 222	. 296	. 445
	12½	. 459	. 073	. 147	. 220	. 293	. 440
	15	. 457	. 072	. 143	. 215	. 287	. 430
	17½	. 456	. 070	. 140	. 210	. 280	. 420
	18¾	. 455	. 069	. 138	. 208	. 277	. 415
	20	2. 455	3. 068	6. 137	9. 205	12. 274	18. 410
	22½	. 453	. 067	. 134	. 200	. 267	. 401
	25	. 452	. 065	. 130	. 195	. 260	. 391
	26¼	. 451	. 064	. 129	. 193	. 257	. 386
	27½	. 451	. 063	. 127	. 190	. 254	. 381
	30	2. 449	3. 062	6. 124	9. 186	12. 247	18. 371
	32½	. 448	. 060	. 120	. 181	. 241	. 361
	33¾	. 447	. 059	. 119	. 178	. 238	. 356
	35	. 447	. 059	. 117	. 176	. 234	. 351
	37½	. 446	. 057	. 114	. 171	. 228	. 342
	40	2. 444	3. 055	6. 111	9. 166	12. 221	18. 332
	41¼	. 444	. 054	. 109	. 163	. 218	. 327
	42½	. 443	. 054	. 107	. 161	. 215	. 322
	45	. 442	. 052	. 104	. 156	. 208	. 312
	47½	. 440	. 050	. 101	. 151	. 201	. 302
	48¾	. 440	. 050	. 099	. 149	. 198	. 297
	50	2. 439	3. 049	6. 097	9. 146	12. 195	18. 292
	52½	. 438	. 047	. 094	. 141	. 188	. 282
	55	. 436	. 045	. 091	. 136	. 181	. 272
	56¼	. 436	. 045	. 089	. 134	. 178	. 267
	57½	. 435	. 044	. 087	. 131	. 175	. 262
37	00	2. 434	3. 042	6. 084	9. 126	12. 168	18. 252
	02½	. 432	. 040	. 081	. 121	. 162	. 242
	03¾	. 432	. 040	. 079	. 119	. 158	. 237
	05	. 431	. 039	. 077	. 116	. 155	. 232
	07½	. 430	. 037	. 074	. 111	. 148	. 222
	10	2. 428	3. 035	6. 071	9. 106	12. 142	18. 212
	11¼	. 428	. 035	. 069	. 104	. 138	. 207
	12½	. 427	. 034	. 067	. 101	. 135	. 102
	15	. 426	. 032	. 064	. 096	. 128	. 192
	17½	. 424	. 030	. 061	. 091	. 121	. 182
	18¾	. 424	. 030	. 059	. 089	. 118	. 177
	20	2. 423	3. 029	6. 057	9. 086	12. 115	18. 172
	22½	. 422	. 027	. 054	. 081	. 108	. 162
	25	. 420	. 025	. 051	. 076	. 101	. 152
	26¼	. 420	. 025	. 049	. 074	. 098	. 147
	27½	. 419	. 024	. 047	. 071	. 095	. 142
	30	2. 418	3. 022	6. 044	9. 066	12. 088	18. 132
	32½	. 416	. 020	. 041	. 061	. 081	. 122
	33¾	. 416	. 020	. 039	. 059	. 078	. 117
	35	. 415	. 019	. 037	. 056	. 075	. 112
	37½	. 414	. 017	. 034	. 051	. 068	. 102
	40	2. 412	3. 015	6. 031	9. 046	12. 061	18. 092
	41¼	. 412	. 014	. 029	. 043	. 058	. 087
	42½	. 411	. 014	. 027	. 041	. 054	. 082
	45	. 410	. 012	. 024	. 036	. 048	. 071
	47½	. 408	. 010	. 020	. 031	. 041	. 061
	48¾	. 407	. 009	. 019	. 028	. 038	. 056
	50	2. 407	3. 009	6. 017	9. 026	12. 034	18. 051
	52½	. 405	. 007	. 014	. 021	. 027	. 041
	55	. 404	. 005	. 010	. 015	. 021	. 031
	56¼	. 403	. 004	. 009	. 013	. 017	. 026
	57½	. 403	. 003	. 007	. 010	. 014	. 021
38	00	2. 401	3. 002	6. 004	9. 005	12. 007	18. 011

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 36°	1¼	3. 792	0. 000
	2½	7. 584	. 001
	3¾	11. 376	. 003
	5	15. 168	. 005
	6¼	18. 960	. 008
	7½	22. 752	. 012
	10	30. 336	. 021
	12½	37. 921	. 033
	15	45. 504	. 047
For latitude 37°	1¼	3. 793	0. 000
	2½	7. 585	. 001
	3¾	11. 378	. 003
	5	15. 170	. 005
	6¼	18. 964	. 008
	7½	22. 756	. 012
	10	30. 341	. 021
	12½	37. 927	. 033
	15	45. 512	. 048
For latitude 38°	1¼	3. 793	0. 000
	2½	7. 587	. 001
	3¾	11. 380	. 003
	5	15. 173	. 005
	6¼	18. 967	. 008
	7½	22. 760	. 012
	10	30. 346	. 021
	12½	37. 935	. 034
	15	45. 520	. 048

TABLE 4.—*Coordinates for the projection of maps, scale* $\frac{1}{24000}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval: 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
38 00	2.401	3.002	6.004	9.005	12.007	18.011
02½	.400	.000	.000	.000	.000	.000
03¾	.399	2.999	5.998	8.998	11.997	17.995
05	.399	.998	.997	.995	.993	.990
07½	.397	.997	.993	.990	.987	.980
10	2.396	2.995	5.990	8.985	11.980	17.970
11¼	.395	.994	.988	.982	.976	.965
12½	.395	.993	.986	.980	.973	.959
15	.393	.992	.983	.975	.966	.949
17½	.392	.990	.980	.969	.959	.939
18¾	.391	.989	.978	.967	.956	.934
20	2.391	2.988	5.976	8.964	11.952	17.929
22½	.389	.986	.973	.959	.946	.918
25	.388	.985	.969	.954	.939	.908
26¼	.387	.984	.968	.951	.935	.903
27½	.386	.983	.966	.949	.932	.898
30	2.385	2.981	5.963	8.944	11.925	17.888
32½	.384	.980	.959	.939	.918	.877
33¾	.383	.979	.957	.936	.915	.872
35	.382	.978	.956	.933	.911	.867
37½	.381	.976	.952	.928	.904	.857
40	2.380	2.974	5.949	8.923	11.897	17.846
41¼	.379	.974	.947	.921	.894	.841
42½	.378	.973	.945	.918	.891	.836
45	.377	.971	.942	.913	.884	.826
47½	.375	.969	.938	.908	.877	.815
48¾	.375	.968	.937	.905	.873	.810
50	2.374	2.967	5.935	8.902	11.870	17.805
52½	.373	.966	.931	.897	.863	.794
55	.371	.964	.928	.892	.856	.784
56¼	.370	.963	.926	.889	.852	.779
57½	.370	.962	.924	.887	.849	.774
39 00	2.368	2.961	5.921	8.882	11.842	17.763
02½	.367	.959	.918	.876	.835	.753
03¾	.366	.958	.916	.874	.832	.748
05	.366	.957	.914	.871	.828	.742
07½	.364	.955	.911	.866	.821	.732
10	2.363	2.954	5.907	8.861	11.814	17.721
11¼	.362	.953	.905	.858	.811	.716
12½	.361	.952	.904	.856	.807	.711
15	.360	.950	.900	.850	.800	.701
17½	.359	.948	.897	.845	.793	.690
18¾	.358	.947	.895	.842	.790	.685
20	2.357	2.947	5.893	8.840	11.786	17.680
22½	.356	.945	.890	.835	.779	.669
25	.354	.943	.886	.829	.772	.658
26¼	.354	.942	.884	.827	.769	.653
27½	.353	.941	.883	.824	.765	.648
30	2.352	2.940	5.879	8.819	11.758	17.638
32½	.350	.938	.876	.813	.751	.627
33¾	.350	.937	.874	.811	.748	.622
35	.349	.936	.872	.808	.744	.616
37½	.347	.934	.869	.803	.737	.606
40	2.346	2.933	5.865	8.798	11.730	17.595
41¼	.345	.932	.863	.795	.727	.590
42½	.345	.931	.862	.792	.723	.585
45	.343	.929	.858	.787	.716	.574
47½	.342	.927	.855	.782	.709	.564
48¾	.341	.926	.853	.779	.705	.558
50	2.340	2.925	5.851	8.776	11.702	17.553
52½	.339	.924	.847	.777	.695	.542
55	.338	.922	.844	.766	.688	.532
56¼	.337	.921	.842	.763	.684	.526
57½	.336	.920	.840	.761	.681	.521
40 00	2.335	2.918	5.837	8.755	11.674	17.510

Ordinates of developed parallel and meridional distances: Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 38°	1¼	3.793	0.000
	2½	7.587	.001
	3¾	11.380	.003
	5	15.173	.005
	6¼	18.967	.008
	7½	22.760	.012
	10	30.346	.021
	12½	37.935	.034
	15	45.520	.048
For latitude 39°	1¼	3.794	0.000
	2½	7.588	.001
	3¾	11.382	.003
	5	15.176	.005
	6¼	18.970	.008
	7½	22.764	.012
	10	30.352	.022
	12½	37.940	.034
	15	45.527	.049
For latitude 40°	1¼	3.795	0.000
	2½	7.589	.001
	3¾	11.384	.003
	5	15.178	.005
	6¼	18.973	.009
	7½	22.768	.012
	10	30.357	.022
	12½	37.947	.034
	15	45.536	.049

TABLE 4.—*Coordinates for the projection of maps, scale* $\frac{1}{24000}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
40 00	2.335	2.918	5.837	8.755	11.674	17.510
02½	.333	.917	.833	.750	.667	.500
03¾	.333	.916	.831	.747	.663	.494
05	.332	.915	.830	.745	.659	.489
07½	.330	.913	.826	.739	.652	.479
10	2.329	2.911	5.823	8.734	11.645	17.468
11¼	.328	.910	.821	.731	.642	.462
12½	.328	.910	.819	.729	.638	.457
15	.326	.908	.815	.723	.631	.446
17½	.325	.906	.812	.718	.624	.436
18¾	.324	.905	.810	.715	.620	.430
20	2.323	2.904	5.808	8.712	11.617	17.425
22½	.322	.902	.805	.707	.610	.414
25	.321	.901	.801	.702	.602	.404
26¼	.320	.900	.799	.699	.599	.398
27½	.319	.899	.798	.696	.595	.393
30	2.318	2.897	5.794	8.691	11.588	17.382
32½	.316	.895	.790	.686	.581	.371
33¾	.315	.894	.789	.683	.577	.366
35	.315	.893	.787	.680	.574	.361
37½	.313	.892	.783	.675	.567	.350
40	2.312	2.890	5.780	8.670	11.559	17.339
41¼	.311	.889	.778	.667	.556	.334
42½	.310	.888	.776	.664	.552	.328
45	.309	.886	.772	.659	.545	.317
47½	.308	.884	.769	.653	.538	.306
48¾	.307	.884	.767	.651	.534	.301
50	2.306	2.883	5.765	8.648	11.531	17.296
52½	.305	.881	.762	.642	.523	.285
55	.303	.879	.758	.637	.516	.274
56¼	.303	.878	.756	.634	.512	.269
57½	.302	.877	.754	.632	.509	.263
41 00	2.300	2.875	5.751	8.626	11.502	17.252
02½	.299	.874	.747	.621	.494	.241
03¾	.298	.873	.745	.618	.491	.236
05	.297	.872	.744	.615	.487	.231
07½	.296	.870	.740	.610	.480	.220
10	2.295	2.868	5.736	8.604	11.473	17.209
11¼	.294	.867	.734	.602	.469	.203
12½	.293	.866	.733	.599	.465	.198
15	.292	.864	.729	.594	.458	.187
17½	.290	.863	.725	.588	.451	.176
18¾	.289	.862	.724	.585	.447	.171
20	2.289	2.862	5.722	8.583	11.443	17.165
22½	.287	.859	.718	.577	.436	.154
25	.286	.857	.714	.572	.429	.143
26¼	.285	.856	.713	.569	.425	.138
27½	.284	.855	.711	.566	.422	.132
30	2.283	2.854	5.707	8.561	11.414	17.121
32½	.281	.852	.703	.555	.407	.110
33¾	.281	.851	.702	.552	.403	.105
35	.280	.850	.700	.550	.400	.099
37½	.279	.848	.696	.544	.392	.088
40	2.277	2.846	5.692	8.539	11.385	17.077
41¼	.276	.845	.691	.536	.381	.072
42½	.276	.844	.689	.533	.378	.066
45	.274	.843	.685	.528	.370	.055
47½	.273	.841	.681	.522	.363	.044
48¾	.272	.840	.680	.519	.359	.039
50	2.271	2.839	5.678	8.517	11.356	17.033
52½	.270	.837	.674	.511	.348	.022
55	.268	.835	.670	.506	.341	.011
56¼	.267	.834	.669	.503	.337	.006
57½	.267	.833	.667	.500	.333	.000
42 00	2.265	2.831	5.663	8.494	11.326	16.989

Ordinates of developed parallel and meridional distances — Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 40°	1¼	3.795	0.000
	2½	7.589	.001
	3¾	11.384	.003
	5	15.178	.005
	6¼	18.973	.009
	7½	22.768	.012
	10	30.357	.022
	12½	37.947	.034
	15	45.536	.049
For latitude 41°	1¼	3.795	0.000
	2½	7.590	.001
	3¾	11.386	.003
	5	15.181	.005
	6¼	18.977	.009
	7½	22.772	.012
	10	30.362	.022
	12½	37.953	.034
	15	45.544	.049
For latitude 42°	1¼	3.796	0.000
	2½	7.592	.001
	3¾	11.388	.003
	5	15.184	.006
	6¼	18.980	.009
	7½	22.776	.012
	10	30.367	.022
	12½	37.960	.034
	15	45.551	.050

TABLE 4.—*Coordinates for the projection of maps, scale $\frac{1}{24000}$*—Continued

Latitude of parallel	Abscissas of developed parallel: Longitude interval 1′	1¼′	2½′	3¾′	5	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
42 00	2.265	2.831	5.663	8.494	11.326	16.989
02½	.264	.830	.659	.489	.319	.978
03¾	.263	.829	.657	.486	.315	.972
05	.262	.828	.656	.483	.311	.967
07½	.261	.826	.652	.478	.304	.956
10	2.259	2.824	5.648	8.472	11.296	16.945
11¼	.259	.823	.646	.470	.293	.939
12½	.258	.822	.644	.467	.289	.933
15	.256	.820	.641	.462	.282	.922
17½	.255	.819	.637	.456	.274	.911
18¾	.254	.818	.635	.453	.270	.906
20	2.253	2.817	5.633	8.450	11.267	16.900
22½	.252	.815	.630	.444	.259	.889
25	.250	.813	.626	.439	.252	.878
26¼	.250	.812	.624	.436	.248	.872
27½	.249	.811	.622	.433	.244	.867
30	2.247	2.809	5.618	8.428	11.237	16.855
32½	.246	.807	.615	.422	.229	.844
33¾	.245	.807	.613	.419	.226	.839
35	.244	.805	.611	.416	.222	.833
37½	.243	.804	.607	.411	.215	.822
40	2.241	2.802	5.604	8.405	11.207	16.811
41¼	.241	.801	.602	.402	.203	.805
42½	.240	.800	.600	.400	.200	.799
45	.238	.798	.596	.394	.192	.788
47½	.237	.796	.592	.388	.184	.777
48¾	.236	.795	.590	.386	.181	.771
50	2.235	2.794	5.589	8.383	11.177	16.766
52½	.234	.792	.585	.377	.169	.754
55	.232	.790	.581	.371	.162	.743
56¼	.232	.790	.579	.369	.158	.737
57½	.231	.789	.577	.366	.154	.732
43 00	2.229	2.787	5.574	8.360	11.147	16.721
02½	.228	.785	.570	.355	.139	.709
03¾	.227	.784	.568	.352	.136	.704
05	.226	.783	.566	.349	.132	.698
07½	.225	.781	.562	.343	.124	.687
10	2.223	2.779	5.558	8.338	11.117	16.675
11¼	.223	.778	.557	.335	.113	.670
12½	.222	.777	.555	.332	.109	.664
15	.220	.775	.551	.326	.102	652
17½	.219	.774	.547	.321	.094	.641
18¾	.218	.773	.545	.318	.090	.635
20	2.217	2.772	5.543	8.315	11.086	16.630
22½	.216	.770	.539	.309	.079	.618
25	.214	.768	.536	.304	.071	.607
26¼	.213	.767	.534	.301	.068	.601
27½	.213	.766	.532	.298	.064	.596
30	2.211	2.764	5.528	8.292	11.056	16.584
32½	.210	.762	.524	.286	.049	.573
33¾	.209	.761	.522	.284	.045	.567
35	.208	.760	.520	.281	.041	.561
37½	.207	.758	.517	.275	.033	.550
40	2.205	2.756	5.513	8.269	11.026	16.538
41¼	.204	.755	.511	.266	.022	.533
42½	.204	.754	.509	.263	.018	.527
45	.202	.753	.505	.258	.010	.516
47½	.201	.751	.501	.252	.003	.504
48¾	.200	.750	.499	.249	10.999	.498
50	2.199	2.749	5.498	8.246	10.995	16.493
52½	.197	.747	.494	.241	.987	.481
55	.196	.745	.490	.235	.980	.470
56¼	.195	.744	.488	.232	.976	.464
57½	.194	.743	.486	.229	.972	.458
44 00	2.193	2.741	5.482	8.223	10.964	16.447

Ordinates of developed parallel and meridional distances: Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 42°	1¼	3.796	0.000
	2½	7.592	.001
	3¾	11.388	.003
	5	15.184	.006
	6¼	18.980	.009
	7½	22.776	.012
	10	30.367	.022
	12½	37.960	.034
	15	45.551	.050
For latitude 43°	1¼	3.797	0.000
	2½	7.593	.001
	3¾	11.390	.003
	5	15.186	.006
	6¼	18.983	.009
	7½	22.780	.012
	10	30.373	.022
	12½	37.967	.035
	15	45.560	.050
For latitude 44°	1¼	3.797	0.000
	2½	7.594	.001
	3¾	11.392	.003
	5	15.189	.006
	6¼	18.987	.009
	7½	22.784	.012
	10	30.378	.022
	12½	37.974	.035
	15	45.568	.050

TABLE 4.—*Coordinates for the projection of maps, scale $\frac{1}{24000}$*—Continued

Latitude of parallel	Abscissas of developed parallel					
	Longitude interval					
	1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
44 00	2.193	2.741	5.482	8.223	10.964	16.447
02½	.191	.739	.478	.218	.957	.435
03¾	.191	.738	.476	.215	.953	.429
05	.190	.737	.475	.212	.949	.424
07½	.188	.735	.471	.206	.941	.412
10	2.187	2.733	5.467	8.200	10.934	16.401
11¼	.186	.732	.465	.197	.930	.395
12½	.185	.732	.463	.195	.926	.389
15	.184	.730	.459	.189	.918	.376
17½	.182	.728	.455	.183	.911	.366
18¾	.181	.727	.453	.180	.907	.360
20	2.181	2.726	5.451	8.177	10.903	16.354
22½	.179	.724	.448	.171	.895	.343
25	.177	.722	.444	.166	.887	.331
26¼	.177	.721	.442	.163	.884	.325
27½	.176	.720	.440	.160	.880	.320
30	2.174	2.718	5.436	8.154	10.872	16.308
32½	.173	.716	.432	.148	.864	.296
33¾	.172	.715	.430	.145	.860	.291
35	.171	.714	.428	.142	.856	.285
37½	.170	.712	.424	.137	.849	.273
40	2.168	2.710	5.420	8.131	10.841	16.261
41¼	.167	.709	.419	.128	.837	.256
42½	.167	.708	.417	.125	.833	.250
45	.165	.706	.413	.119	.825	.238
47½	.164	.704	.409	.113	.818	.227
48¾	.163	.703	.407	.110	.814	.221
50	2.162	2.702	5.405	8.107	10.810	16.215
52½	.160	.701	.401	.102	.802	.203
55	.159	.699	.397	.096	.794	.191
56¼	.158	.698	.395	.093	.790	.186
57½	.157	.697	.393	.090	.787	.180
45 00	2.156	2.695	5.389	8.084	10.779	16.168
02½	.154	.693	.385	.078	.770	.156
03¾	.153	.692	.383	.075	.767	.150
05	.153	.691	.381	.072	.763	.144
07½	.151	.689	.378	.066	.755	.133
10	2.149	2.687	5.374	8.061	10.747	16.121
11¼	.149	.686	.372	.058	.743	.115
12½	.148	.685	.370	.055	.740	.109
15	.146	.683	.366	.049	.732	.097
17½	.145	.681	.362	.043	.724	.086
18¾	.144	.680	.360	.040	.720	.080
20	2.143	2.679	5.358	8.037	10.716	16.074
22½	.142	.677	.354	.031	.708	.062
25	.140	.675	.350	.025	.700	.050
26¼	.139	.674	.348	.022	.696	.045
27½	.139	.673	.346	.019	.692	.039
30	2.137	2.671	5.342	8.013	10.685	16.027
32½	.135	.669	.338	.007	.677	.015
33¾	.134	.668	.336	.004	.673	.009
35	.134	.667	.334	.001	.669	.003
37½	.132	.665	.330	7.996	.661	15.991
40	2.131	2.663	5.326	7.990	10.653	15.979
41¼	.130	.662	.324	.987	.649	.973
42½	.129	.661	.323	.984	.645	.968
45	.127	.659	.319	.978	.637	.956
47½	.126	.657	.315	.972	.629	.944
48¾	.125	.656	.313	.969	.625	.938
50	2.124	2.655	5.311	7.966	10.621	15.932
52½	.123	.653	.307	.960	.613	.920
55	.121	.651	.303	.954	.605	.908
56¼	.120	.650	.301	.951	.601	.902
57½	.119	.649	.299	.948	.597	.896
46 00	2.118	2.647	5.295	7.942	10.590	15.884

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 44°	1¼	3.797	0.000
	2½	7.594	.001
	3¾	11.392	.003
	5	15.189	.006
	6¼	18.987	.009
	7½	22.784	.012
	10	30.378	.022
	12½	37.974	.035
	15	45.568	.050
For latitude 45°	1¼	3.798	0.000
	2½	7.596	.001
	3¾	11.394	.003
	5	15.192	.006
	6¼	18.990	.009
	7½	22.788	.012
	10	30.384	.022
	12½	37.980	.035
	15	45.576	.050
For latitude 46°	1¼	3.799	0.000
	2½	7.597	.001
	3¾	11.396	.003
	5	15.194	.006
	6¼	18.994	.009
	7½	22.792	.012
	10	30.389	.022
	12½	37.987	.035
	15	45.584	.050

TABLE 4.—*Coordinates for the projection of maps, scale $\frac{1}{24000}$*—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval 1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
46 00	2.118	2.647	5.295	7.942	10.590	15.884
02½	.116	.645	.291	.936	.582	.872
03¾	.116	.644	.289	.933	.578	.867
05	.115	.643	.287	.930	.574	.861
07½	.113	.641	.283	.924	.566	.849
10	2.112	2.639	5.279	7.918	10.558	15.837
11¼	.111	.638	.277	.915	.554	.831
12½	.110	.637	.275	.912	.550	.825
15	.108	.635	.271	.906	.542	.813
17½	.107	.633	.267	.900	.534	.801
18¾	.106	.632	.265	.897	.530	.795
20	2.105	2.631	5.263	7.894	10.526	15.789
22½	.104	.629	.259	.888	.518	.777
25	.102	.627	.255	.882	.510	.765
26¼	.101	.626	.253	.879	.506	.759
27½	.100	.625	.251	.876	.502	.753
30	2.099	2.623	5.247	7.870	10.494	15.741
32½	.097	.621	.243	.864	.486	.729
33¾	.096	.620	.241	.861	.482	.723
35	.096	.619	.239	.858	.478	.717
37½	.094	.617	.235	.852	.470	.705
40	2.092	2.615	5.231	7.846	10.462	15.692
41¼	.092	.614	.229	.843	.458	.686
42½	.091	.613	.227	.840	.454	.680
45	.089	.611	.223	.834	.446	.668
47½	.087	.609	.219	.828	.438	.656
48¾	.087	.608	.217	.825	.434	.650
50	2.086	2.607	5.215	7.822	10.429	15.644
52½	.084	.605	.211	.816	.421	.632
55	.083	.603	.207	.810	.413	.620
56¼	.082	.602	.205	.807	.409	.614
57½	.081	.601	.203	.804	.405	.608
47 00	2.079	2.599	5.199	7.798	10.397	15.596
02½	.078	.597	.195	.792	.389	.584
03¾	.077	.596	.192	.789	.385	.577
05	.076	.595	.190	.786	.381	.571
07½	.075	.593	.186	.780	.373	.559
10	2.073	2.591	5.182	7.774	10.365	15.547
11¼	.072	.590	.180	.771	.361	.541
12½	.071	.589	.178	.768	.357	.535
15	.070	.587	.174	.763	.349	.523
17½	.068	.585	.170	.755	.341	.511
18¾	.067	.584	.168	.752	.336	.505
20	2.066	2.583	5.166	7.749	10.332	15.499
22½	.065	.581	.162	.743	.324	.486
25	.063	.579	.158	.737	.316	.474
26¼	.062	.578	.156	.734	.312	.468
27½	.062	.577	.154	.731	.308	.462
30	2.060	2.575	5.150	7.725	10.300	15.450
32½	.058	.573	.146	.719	.292	.437
33¾	.058	.572	.144	.716	.288	.431
35	.057	.571	.142	.713	.284	.425
37½	.055	.569	.138	.706	.275	.413
40	2.053	2.566	5.134	7.700	10.267	15.401
41¼	.053	.566	.131	.697	.263	.394
42½	.052	.565	.129	.694	.259	.388
45	.050	.563	.125	.688	.251	.376
47½	.049	.561	.121	.682	.243	.364
48¾	.048	.560	.119	.679	.239	.358
50	2.047	2.559	5.117	7.676	10.234	15.352
52½	.045	.557	.113	.670	.226	.339
55	.044	.555	.109	.664	.218	.327
56¼	.043	.553	.107	.660	.214	.321
57½	.042	.552	.105	.657	.210	.315
48 00	2.040	2.550	5.101	7.651	10.202	15.302

Ordinates of developed parallel and meridional distances

Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 46°	1¼	3.799	0.000
	2½	7.597	.001
	3¾	11.396	.003
	5	15.194	.006
	6¼	18.994	.009
	7½	22.792	.012
	10	30.389	.022
	12½	37.987	.035
	15	45.584	.050
For latitude 47°	1¼	3.799	0.000
	2½	7.599	.001
	3¾	11.398	.003
	5	15.197	.006
	6¼	18.997	.009
	7½	22.796	.012
	10	30.394	.022
	12½	37.994	.035
	15	45.592	.050
For latitude 48°	1¼	3.800	0.000
	2½	7.600	.001
	3¾	11.400	.003
	5	15.200	.006
	6¼	19.000	.009
	7½	22.800	.012
	10	30.400	.021
	12½	38.001	.035
	15	45.600	.050

TABLE 4.—*Coordinates for the projection of maps, scale* $\frac{1}{24000}$—Continued

Latitude of parallel	Abscissas of developed parallel					
	Longitude interval					
	1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
48 00	2.040	2.550	5.101	7.651	10.202	15.302
02½	.039	.548	.097	.645	.193	.290
03¾	.038	.547	.095	.642	.189	.284
05	.037	.546	.093	.639	.185	.278
07½	.035	.544	.088	.633	.177	.265
10	2.034	2.542	5.084	7.626	10.169	15.253
11¼	.033	.541	.082	.623	.165	.247
12½	.032	.540	.080	.620	.160	.241
15	.030	.538	.076	.614	.152	.228
17½	.029	.536	.072	.608	.144	.216
18¾	.028	.535	.070	.605	.140	.210
20	2.027	2.534	5.068	7.602	10.136	15.204
22½	.025	.532	.064	.596	.127	.191
25	.024	.530	.060	.589	.119	.179
26¼	.023	.529	.058	.586	.115	.173
27½	.022	.528	.055	.583	.111	.166
30	2.020	2.526	5.051	7.577	10.103	15.154
32½	.019	.524	.047	.571	.094	.142
33¾	.018	.523	.045	.568	.090	.135
35	.017	.521	.043	.564	.086	.129
37½	.016	.519	.039	.558	.078	.117
40	2.014	2.517	5.035	7.552	10.069	15.104
41¼	.013	.516	.033	.549	.065	.098
42½	.012	.515	.031	.546	.061	.092
45	.011	.513	.027	.540	.053	.079
47½	.009	.511	.022	.533	.045	.067
48¾	.008	.510	.020	.530	.040	.061
50	2.007	2.509	5.018	7.527	10.036	15.054
52½	.006	.507	.014	.521	.028	.042
55	.004	.505	.010	.515	.020	.029
56¼	.003	.504	.008	.512	.015	.023
57½	.002	.503	.006	.508	.011	.017
49 00	2.001	2.501	5.001	7.502	10.003	15.004
02½	1.999	.499	4.997	.496	9.995	14.992
03¾	.998	.498	.995	.493	.990	.986
05	.997	.497	.993	.490	.986	.979
07½	.996	.494	.989	.483	.978	.967
10	1.994	2.492	4.985	7.477	9.970	14.954
11¼	.993	.491	.983	.474	.965	.948
12½	.992	.490	.981	.471	.961	.942
15	.991	.488	.976	.465	.953	.929
17½	.989	.486	.972	.458	.944	.917
18¾	.988	.485	.970	.455	.940	.910
20	1.987	2.484	4.968	7.452	9.936	14.904
22½	.986	.482	.964	.446	.928	.891
25	.984	.480	.960	.439	.919	.879
26¼	.983	.479	.957	.436	.915	.872
27½	.982	.478	.955	.433	.911	.866
30	1.980	2.476	4.951	7.427	9.902	14.854
32½	.979	.473	.947	.420	.894	.841
33¾	.978	.472	.945	.417	.890	.835
35	.977	.471	.943	.414	.886	.828
37½	.975	.469	.939	.408	.877	.816
40	1.974	2.467	4.934	7.401	9.869	14.803
41¼	.973	.466	.932	.398	.864	.797
42½	.972	.465	.930	.395	.860	.790
45	.970	.463	.926	.389	.852	.778
47½	.969	.461	.922	.383	.843	.765
48¾	.968	.460	.920	.379	.839	.759
50	1.967	2.459	4.918	7.376	9.835	14.753
52½	.965	.457	.913	.370	.826	.740
55	.964	.454	.909	.363	.818	.727
56¼	.963	.453	.907	.360	.814	.721
57½	.962	.452	.905	.357	.810	.714
50 00	1.960	2.450	4.901	7.351	9.801	14.702

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 48°	1¼	3.800	0.000
	2½	7.600	.001
	3¾	11.400	.003
	5	15.200	.005
	6¼	19.000	.009
	7½	22.800	.012
	10	30.400	.022
	12½	38.001	.034
	15	45.600	.050
For latitude 49°	1¼	3.801	0.000
	2½	7.601	.001
	3¾	11.402	.003
	5	15.202	.005
	6¼	19.004	.009
	7½	22.804	.012
	10	30.405	.022
	12½	38.007	.034
	15	45.608	.049
For latitude 50°	1¼	3.801	0.000
	2½	7.603	.001
	3¾	11.404	.003
	5	15.205	.005
	6¼	19.007	.009
	7½	22.808	.012
	10	30.411	.022
	12½	38.014	.034
	15	45.617	.049

TABLE 4.—*Coordinates for the projection of maps, scale* $\frac{1}{24000}$—Continued

Latitude of parallel	Abscissas of developed parallel — Longitude interval					
	1′	1¼′	2½′	3¾′	5′	7½′
° ′	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
50 00	1.960	2.450	4.901	7.351	9.801	14.702
02½	.959	.448	.896	.344	.793	.689
03¾	.958	.447	.894	.341	.788	.683
05	.957	.446	.892	.338	.784	.676
07½	.955	.444	.888	.332	.776	.664
10	1.953	2.442	4.884	7.325	9.767	14.651
11¼	.953	.441	.882	.322	.763	.645
12½	.952	.440	.879	.319	.759	.638
15	.950	.438	.875	.313	.750	.625
17½	.948	.435	.871	.306	.742	.613
18¾	.948	.434	.869	.303	.737	.606
20	1.947	2.433	4.867	7.300	9.733	14.600
22½	.945	.431	.862	.293	.725	.587
25	.943	.429	.858	.287	.716	.574
26¼	.942	.428	.856	.284	.712	.568
27½	.942	.427	.854	.281	.708	.561
30	1.940	2.425	4.850	7.274	9.699	14.549
32½	.938	.423	.845	.268	.691	.536
33¾	.937	.422	.843	.265	.686	.529
35	.936	.420	.841	.261	.682	.523
37½	.935	.418	.837	.255	.674	.510
40	1.933	2.416	4.833	7.249	9.665	14.498
41¼	.932	.415	.830	.246	.661	.491
42½	.931	.414	.828	.242	.656	.485
45	.930	.412	.824	.236	.648	.472
47½	.928	.410	.820	.229	.639	.459
48¾	.927	.409	.818	.226	.635	.453
50	1.926	2.408	4.815	7.223	9.631	14.446
52½	.924	.406	.811	.217	.622	.433
55	.923	.403	.807	.210	.614	.420
56¼	.922	.402	.805	.207	.609	.414
57½	.921	.401	.802	.204	.605	.408
51 00	1.919	2.399	4.798	7.197	9.596	14.395
02½	.918	.397	.794	.191	.588	.382
03¾	.917	.396	.792	.188	.583	.375
05	.916	.395	.790	.184	.579	.369
07½	.914	.393	.785	.178	.571	.356
10	1.912	2.390	4.781	7.171	9.562	14.343
11¼	.912	.389	.779	.168	.558	.336
12½	.911	.388	.777	.165	.553	.330
15	.909	.386	.772	.159	.545	.317
17½	.907	.384	.768	.152	.536	.304
18¾	.906	.383	.766	.149	.532	.298
20	1.906	2.382	4.764	7.146	9.528	14.291
22½	.904	.380	.759	.139	.519	.278
25	.902	.377	.755	.133	.510	.265
26¼	.901	.376	.753	.129	.506	.259
27½	.900	.375	.751	.126	.501	.252
30	1.899	2.373	4.746	7.120	9.493	14.239
32½	.897	.371	.742	.113	.484	.226
33¾	.896	.370	.740	.110	.480	.220
35	.895	.369	.738	.107	.476	.213
37½	.893	.367	.733	.100	.467	.200
40	1.892	2.364	4.729	7.094	9.458	14.187
41¼	.891	.363	.727	.090	.454	.181
42½	.890	.362	.725	.087	.450	.174
45	.888	.360	.720	.081	.441	.161
47½	.886	.358	.716	.074	.432	.148
48¾	.885	.357	.714	.071	.428	.142
50	1.885	2.356	4.712	7.068	9.424	14.135
52½	.883	.354	.707	.061	.415	.122
55	.881	.352	.703	.055	.406	.109
56¼	.880	.350	.701	.051	.402	.103
57½	.879	.349	.699	.048	.397	.096
52 00	1.878	2.347	4.694	7.042	9.389	14.083

Ordinates of developed parallel and meridional distances			
Latitude and longitude intervals		Meridional distance	Ordinate of developed parallel
	′	*Inches*	*Inch*
For latitude 50°	1¼	3.801	0.000
	2½	7.603	.001
	3¾	11.404	.003
	5	15.205	.005
	6¼	19.007	.009
	7½	22.808	.012
	10	30.411	.022
	12½	38.014	.034
	15	45.617	.049
For latitude 51°	1¼	3.802	0.000
	2½	7.604	.001
	3¾	11.406	.003
	5	15.208	.005
	6¼	19.010	.008
	7½	22.812	.012
	10	30.416	.022
	12½	38.021	.034
	15	45.625	.049

TABLE 5.—*Coordinates of intersections of meridians and parallels and lengths of meridians for each degree of latitude, in meters*

[For modified polyconic projection of map of the world, natural scale]

Latitude (°)	Length of central meridian	Meridian 1° from central meridian			Meridian 2° from central meridian			Meridian 3° from central meridian		
		Length of meridian	X (for lower latitude)	Y (for lower latitude)	Length of meridian	X (for lower latitude)	Y (for lower latitude)	Length of meridian	X (for lower latitude)	Y (for lower latitude)
0– 1	110, 498. 2	110, 515. 2	111, 321. 3	0. 0	110, 565. 9	222, 642. 6	0. 0	110, 650. 5	333, 963. 9	0. 0
1– 2	110, 498. 9	110, 515. 8	111, 253. 9	16. 9	110, 566. 6	222, 507. 9	67. 6	110, 651. 2	333, 761. 7	152. 1
2– 3	110, 500. 3	110, 517. 2	111, 186. 6	33. 8	110, 568. 0	222, 373. 1	135. 2	110, 652. 6	333, 559. 5	304. 2
3– 4	110, 502. 3	110, 519. 3	111, 119. 3	50. 7	110, 570. 0	222, 238. 4	202. 8	110, 654. 6	333, 357. 3	456. 3
(0– 4)	441, 999. 7	442, 067. 5			442, 270. 5			442, 608. 9		
4– 5	110, 505. 7	110, 522. 5	111, 051. 9	67. 6	110, 572. 8	222, 103. 7	270. 4	110, 656. 5	333, 155. 1	608. 4
5– 6	110, 509. 1	110, 525. 9	110, 850. 2	84. 2	110, 576. 2	221, 700. 1	336. 7	110, 660. 0	332, 549. 5	757. 6
6– 7	110, 513. 2	110, 530. 0	110, 648. 5	100. 7	110, 580. 2	221, 296. 6	403. 0	110, 664. 0	331, 943. 9	906. 7
7– 8	110, 518. 0	110, 534. 7	110, 446. 8	117. 3	110, 585. 0	220, 893. 0	469. 3	110, 668. 8	331, 338. 2	1, 055. 9
(4– 8)	442, 046. 0	442, 113. 1			442, 314. 2			442, 649. 3		
8– 9	110, 524. 4	110, 540. 9	110, 245. 1	133. 9	110, 590. 4	220, 489. 5	535. 6	110, 672. 9	330, 732. 6	1, 205. 0
9–10	110, 530. 4	110, 546. 9	109, 909. 9	149. 8	110, 596. 4	219, 819. 0	599. 3	110, 678. 9	329, 726. 4	1, 348. 4
10–11	110, 537. 2	110, 553. 7	109, 574. 8	165. 7	110, 603. 2	219, 148. 5	663. 0	110, 685. 7	328, 720. 1	1, 491. 7
11–12	110, 544. 6	110, 561. 1	109, 239. 6	181. 7	110, 610. 6	218. 477. 9	726. 7	110, 693. 1	327, 713. 8	1, 635. 0
(8–12)	442, 136. 6	442, 202. 6			442, 400. 6			442, 730. 6		
12–13	110, 554. 8	110, 570. 7	108, 904. 4	197. 6	110, 618. 6	217, 807. 3	790. 4	110, 698. 3	326, 707. 4	1, 778. 3
13–14	110, 563. 4	110, 579. 3	108, 437. 4	212. 6	110, 627. 2	216, 873. 0	850. 2	110, 707. 0	325, 305. 3	1, 913. 0
14–15	110, 572. 6	110, 588. 6	107, 970. 3	227. 5	110, 636. 4	215, 968. 7	910. 1	110, 716. 2	323, 903. 1	2, 047. 7
15–16	110, 582. 4	110, 598. 4	107, 503. 2	242. 5	110, 646. 2	215, 034. 2	970. 0	110, 726. 0	322, 500. 8	2, 182. 4
(12–16)	442, 273. 2	442, 337. 0			442, 528. 4			442, 847. 5		
16–17	110, 595. 4	110, 610. 7	107, 036. 1	257. 5	110, 656. 7	214, 069. 7	1, 029. 8	110, 733. 3	321, 098. 3	2, 317. 1
17–18	110, 606. 4	110, 621. 7	106, 439. 3	271. 2	110, 667. 7	212, 875. 9	1, 084. 7	110, 744. 3	319, 306. 8	2, 440. 6
18–19	110, 617. 9	110, 633. 3	105, 842. 5	284. 9	110, 679. 2	211, 681. 9	1, 139. 6	110, 755. 9	317, 515. 2	2, 564. 1
19–20	110, 630. 0	110, 645. 4	105, 245. 7	298. 6	110, 691. 4	210, 487. 9	1, 194. 5	110, 768. 0	315, 723. 3	2, 687. 5
(16–20)	442, 449. 7	442, 511. 1			442, 695. 0			443, 001. 5		

20–21	110, 645. 7	110, 660. 3	104, 648. 7	312. 3	110, 704. 0	209, 293. 7	1, 249. 4	110, 776. 9	313, 931. 2	2, 811. 0
21–22	110, 658. 8	110, 673. 4	103, 925. 0	324. 5	110, 717. 2	207, 845. 9	1, 298. 2	110, 790. 1	311, 758. 7	2, 920. 9
22–23	110, 672. 5	110, 687. 1	103, 201. 2	336. 8	110, 730. 8	206, 398. 0	1, 347. 0	110, 803. 8	309, 585. 9	3, 030. 7
23–24	110, 686. 7	110, 701. 3	102, 477. 3	349. 0	110, 745. 0	204, 949. 9	1, 395. 8	110, 817. 9	307, 412. 8	3, 140. 6
(20–24)	442, 663. 7	442, 722. 1			442, 897. 0			443, 188. 7		
24–25	110, 704. 9	110, 718. 6	101, 753. 3	361. 2	110, 759. 7	203, 501. 6	1, 444. 7	110, 828. 1	305, 239. 5	3, 250. 4
25–26	110, 720. 0	110, 733. 7	100, 906. 0	371. 6	110, 774. 8	201, 806. 5	1, 486. 5	110, 843. 2	302, 696. 1	3, 344. 5
26–27	110, 735. 5	110, 749. 2	100, 058. 6	382. 1	110, 790. 3	200, 111. 3	1, 528. 3	110, 858. 8	300, 152. 3	3, 438. 5
27–28	110, 751. 4	110, 765. 1	99, 211. 0	392. 5	110, 806. 2	198, 415. 8	1, 570. 1	110, 874. 7	297, 608. 2	3, 532. 6
(24–28)	442, 911. 8	442, 966. 6			443, 131. 0			443, 404. 8		
28–29	110, 771. 7	110, 784. 4	98, 363. 4	403. 0	110, 822. 6	196, 720. 1	1, 611. 9	110, 886. 2	295, 063. 7	3, 626. 7
29–30	110, 788. 4	110, 801. 1	97, 396. 4	411. 5	110, 839. 3	194, 785. 8	1, 645. 9	110, 902. 9	292, 161. 2	3, 703. 2
30–31	110, 805. 5	110, 818. 2	96, 429. 2	420. 0	110, 856. 4	192, 851. 2	1, 679. 9	110, 920. 0	289, 258. 4	3, 779. 7
31–32	110, 822. 9	110, 835. 6	95, 462. 0	428. 5	110, 873. 8	190, 916. 2	1, 713. 9	110, 937. 4	286, 355. 1	3, 856. 1
(28–32)	443, 188. 5	443, 239. 3			443, 392. 1			443, 646. 5		
32–33	110, 844. 9	110, 856. 6	94, 494. 5	437. 0	110, 891. 5	188, 981. 0	1, 747. 9	110, 949. 8	283, 451. 3	3, 932. 6
33–34	110, 862. 9	110, 874. 6	93, 412. 4	443. 4	110, 909. 6	186, 816. 4	1, 773. 4	110, 967. 9	280, 203. 5	3, 990. 0
34–35	110, 881. 2	110, 892. 9	92, 330. 1	449. 7	110, 927. 9	184, 651. 5	1, 798. 9	110, 986. 2	276, 955. 3	4, 047. 4
35–36	110, 899. 8	110, 911. 5	91, 247. 7	456. 1	110, 946. 4	182, 486. 2	1, 824. 4	111, 004. 8	273, 706. 4	4, 104. 8
(32–36)	443, 488. 8	443, 535. 6			443, 675. 4			443, 908. 7		
36–37	110, 923. 1	110, 933. 6	90, 165. 0	462. 5	110, 965. 2	180, 320. 5	1, 849. 9	111, 017. 9	270, 457. 0	4, 162. 2
37–38	110, 942. 1	110, 952. 6	88, 972. 8	466. 6	110, 984. 2	177, 935. 8	1, 866. 4	111, 036. 9	266, 879. 3	4, 199. 3
38–39	110, 961. 3	110, 971. 8	87, 780. 4	470. 8	111, 003. 4	175, 550. 8	1, 883. 0	111, 056. 1	263, 300. 9	4, 236. 5
39–40	110, 980. 6	110, 991. 1	86, 587. 9	474. 9	111, 022. 8	173, 165. 3	1, 899. 5	111, 075. 4	259, 721. 9	4, 273. 6
(36–40)	443, 807. 1	443, 849. 1			443, 975. 6			444, 186. 3		
40–41	111, 004. 7	111, 014. 1	85, 395. 1	479. 0	111, 042. 2	170, 779. 4	1, 916. 0	111, 089. 1	256, 142. 2	4, 310. 8
41–42	111, 024. 3	111, 033. 7	84, 098. 5	480. 8	111, 061. 8	168, 186. 0	1, 923. 2	111, 108. 7	252, 251. 4	4, 327. 0
42–43	111, 044. 0	111, 053. 4	82, 801. 7	482. 6	111, 081. 5	165, 592. 0	1, 930. 4	111, 128. 4	248, 359. 9	4, 343. 2
43–44	111, 063. 8	111, 073. 1	81, 504. 6	484. 4	111, 101. 3	162, 997. 7	1, 937. 6	111, 148. 2	244, 467. 7	4, 359. 4
(40–44)	444, 136. 8	444, 174. 3			444, 286. 8			444, 474. 4		
44–45	111, 088. 3	111, 096. 5	80, 207. 3	486. 2	111, 121. 1	160, 402. 8	1, 944. 8	111, 162. 0	240, 574. 8	4, 375. 6
45–46	111, 108. 1	111, 116. 3	78, 812. 5	485. 7	111, 140. 9	157, 612. 9	1, 942. 6	111, 181. 8	236, 389. 4	4, 370. 5
46–47	111, 127. 9	111, 136. 1	77, 417. 3	485. 1	111, 160. 7	154, 822. 5	1, 940. 3	111, 201. 6	232, 203. 3	4, 365. 4
47–48	111, 147. 7	111, 155. 9	76, 022. 0	484. 5	111, 180. 4	152, 031. 6	1, 938. 1	111, 221. 4	228, 016. 5	4, 360. 3
(44–48)	444, 472. 0	444, 504. 8			444, 603. 1			444, 766. 8		

TABLE 5.—*Coordinates of intersections of meridians and parallels and lengths of meridians for each degree of latitude, in meters*—Con.

Latitude (°)	Length of central meridian	Meridian 1° from central meridian			Meridian 2° from central meridian			Meridian 3° from central meridian		
		Length of meridian	X (for lower latitude)	Y (for lower latitude)	Length of meridian	X (for lower latitude)	Y (for lower latitude)	Length of meridian	X (for lower latitude)	Y (for lower latitude)
48–49	111, 172. 1	111, 179. 1	74, 626. 4	484. 0	111, 200. 2	149, 240. 2	1, 935. 8	111, 235. 3	223, 828. 9	4, 355. 2
49–50	111, 191. 7	111, 198. 8	73, 139. 9	481. 1	111, 219. 8	146, 267. 1	1, 924. 1	111, 254. 9	219, 369. 1	4, 329. 0
50–51	111, 211. 3	111, 218. 3	71, 653. 2	478. 1	111, 239. 4	143, 293. 6	1, 912. 4	111, 274. 4	214, 908. 4	4, 302. 7
51–52	111, 230. 7	111, 237. 7	70, 166. 2	475. 2	111, 258. 8	140, 319. 5	1, 900. 8	111, 293. 9	210, 447. 0	4, 276. 4
(48–52)	444, 805. 8	444, 833. 9			444, 918. 2			445, 058. 5		
52–53	111, 254. 5	111, 260. 4	68, 678. 9	472. 3	111, 278. 0	137, 344. 9	1, 889. 1	111, 307. 4	205, 984. 8	4, 250. 1
53–54	111, 273. 6	111, 279. 5	67, 108. 0	467. 1	111, 297. 1	134, 203. 0	1, 868. 2	111, 326. 5	201, 272. 0	4, 203. 1
54–55	111, 292. 5	111, 298. 4	65, 536. 8	461. 9	111, 316. 0	131, 060. 6	1, 847. 3	111, 345. 4	196, 558. 3	4, 156. 1
55–56	111, 311. 2	111, 317. 0	63, 965. 3	456. 6	111, 334. 7	127, 917. 6	1, 826. 4	111, 364. 0	191, 843. 8	4, 109. 1
(52–56)	445, 131. 8	445, 155. 3			445, 225. 8			445, 343. 3		
56–57	111, 334. 0	111, 338. 8	62, 393. 6	451. 4	111, 353. 1	124, 774. 1	1, 805. 5	111, 377. 0	187, 128. 5	4, 062. 1
57–58	111, 352. 2	111, 356. 9	60, 745. 8	444. 0	111, 371. 3	121, 478. 6	1, 775. 9	111, 395. 1	182, 185. 4	3, 995. 3
58–59	111, 370. 0	111, 374. 8	59, 097. 7	436. 6	111, 389. 1	118, 182. 5	1, 746. 2	111, 413. 0	177, 241. 4	3, 928. 5
59–60	111, 387. 6	111, 392. 4	57, 449. 3	429. 1	111, 406. 7	114, 885. 8	1, 716. 5	111, 430. 6	172, 296. 7	3, 861. 7
(56–60)	445, 443. 8	445, 462. 9			445, 520. 2			445, 615. 7		
60			55, 800. 7	421. 7		111, 588. 7	1, 686. 8		167, 351. 2	3, 794. 9

TABLE 6.—*Coordinates of intersections of meridians and parallels and lengths of meridians for each degree of latitude, in inches*

[For modified polyconic projection of map of the world, scale 1:1,000,000]

Latitude (°)	Length of central meridian	Meridian 1° from central meridian			Meridian 2° from central meridian			Meridian 3° from central meridian		
		Length of meridian	X (for lower latitude)	Y (for lower latitude)	Length of meridian	X (for lower latitude)	Y (for lower latitude)	Length of meridian	X (for lower latitude)	Y (for lower latitude)
0–1	4. 350	4. 351	4. 383	0. 000	4. 353	8. 765	0. 000	4. 356	13. 148	0. 000
1–2	4. 350	4. 351	4. 380	. 001	4. 353	8. 760	. 003	4. 356	13. 140	. 006
2–3	4. 350	4. 351	4. 377	. 001	4. 353	8. 755	. 005	4. 356	13. 132	. 012
3–4	4. 350	4. 351	4. 375	. 002	4. 353	8. 750	. 008	4. 356	13. 124	. 018
(0–4)	17. 400	17. 404	--------	--------	17. 412	--------	--------	17. 424	--------	--------
4–5	4. 351	5. 351	4. 372	. 003	4. 353	8. 744	. 011	4. 357	13. 116	. 024
5–6	4. 351	4. 351	4. 364	. 003	4. 353	8. 728	. 013	4. 357	13. 092	. 030
6–7	4. 351	4. 352	4. 356	. 004	4. 354	8. 712	. 016	4. 357	13. 069	. 036
7–8	4. 351	4. 352	4. 348	. 005	4. 354	8. 697	. 018	4. 357	13. 045	. 042
(4–8)	17. 404	17. 406	--------	--------	17. 414	--------	--------	17. 428	--------	--------
8–9	4. 351	4. 352	4. 340	. 005	4. 354	8. 681	. 021	4. 357	13. 021	. 047
9–10	4. 352	4. 352	4. 327	. 006	4. 354	8. 654	. 024	4. 357	12. 981	. 053
10–11	4. 352	4. 353	4. 314	. 007	4. 354	8. 628	. 026	4. 358	12. 942	. 059
11–12	4. 352	4. 353	4. 301	. 007	4. 355	8. 601	. 029	4. 358	12. 902	. 064
(8–12)	17. 407	17. 410	--------	--------	17. 417	--------	--------	17. 430	--------	--------
12–13	4. 353	4. 353	4. 288	. 008	4. 355	8. 575	. 031	4. 358	12. 862	. 070
13–14	4. 353	4. 354	4. 269	. 008	4. 355	8. 538	. 033	4. 359	12. 807	. 075
14–15	4. 353	4. 354	4. 251	. 009	4. 356	8. 503	. 036	4. 359	12. 752	. 081
15–16	4. 354	4. 354	4. 232	. 010	4. 356	8. 466	. 038	4. 359	12. 697	. 086
(12–16)	17. 413	17. 415	--------	--------	17. 422	--------	--------	17. 435	--------	--------
16–17	4. 354	4. 355	4. 214	. 010	4. 357	8. 428	. 041	4. 360	12. 642	. 091
17–18	4. 355	4. 355	4. 191	. 011	4. 357	8. 381	. 043	4. 360	12. 571	. 096
18–19	4. 355	4. 356	4. 167	. 011	4–357	8. 334	. 045	4. 360	12. 501	. 101
19–20	4. 356	4. 356	4. 144	. 012	4. 358	8. 287	. 047	4. 361	12. 430	. 106
(16–20)	17. 420	17. 422	--------	--------	17. 429	--------	--------	17. 441	--------	--------
20–21	4. 356	4. 357	4. 120	. 012	4. 358	8. 240	. 049	4. 361	12. 359	. 111
21–22	4. 357	4. 357	4. 092	. 013	4. 359	8. 183	. 051	4. 362	12. 274	. 115
22–23	4. 357	4. 358	4. 063	. 013	4. 359	8. 126	. 053	4. 362	12. 188	. 119
23–24	4. 358	4. 358	4. 035	. 014	4. 360	8. 069	. 055	4. 363	12. 103	. 124
(20–24)	17. 428	17. 430	--------	--------	17. 436	--------	--------	17. 448	--------	--------
24–25	4. 358	4. 359	4. 006	. 014	4. 361	8. 012	. 057	4. 363	12. 017	. 128
25–26	4. 359	4. 360	3. 973	. 015	4. 361	7. 945	. 059	4. 364	11. 917	. 132
26–27	4. 360	4. 360	3. 939	. 015	4. 362	7. 878	. 060	4. 365	11. 817	. 135
27–28	4. 360	4. 361	3. 906	. 015	4. 362	7. 812	. 062	4. 365	11. 717	. 139
(24–28)	17. 437	17. 440	--------	--------	17. 446	--------	--------	17. 457	--------	--------
28–29	4. 361	4. 362	3. 873	. 016	4. 363	7. 745	. 063	4. 366	11. 617	. 143
29–30	4. 362	4. 362	3. 834	. 016	4. 364	7. 669	. 065	4. 366	11. 502	. 146
30–31	4. 362	4. 363	3. 796	. 017	4. 364	7. 593	. 066	4. 367	11. 388	. 149
31–32	4. 363	4. 364	3. 758	. 017	4. 365	7. 516	. 067	4. 368	11. 274	. 152
(28–32)	17. 448	17. 451	--------	--------	17. 456	--------	--------	17. 467	--------	--------
32–33	4. 364	4. 364	3. 720	. 017	4. 366	7. 440	. 069	4. 368	11. 159	. 155
33–34	4. 365	4. 365	3. 678	. 017	4. 367	7. 355	. 070	4. 369	11. 032	. 157
34–35	4. 365	4. 366	3. 635	. 018	4. 367	7. 270	. 071	4. 370	10. 904	. 159
35–36	4. 366	4. 367	3. 592	. 018	4. 368	7. 184	. 072	4. 370	10. 776	. 162
(32–36)	17. 460	17. 462	--------	--------	17. 468	--------	--------	17. 477	--------	--------
36–37	4. 367	4. 367	3. 550	. 018	4. 369	7. 099	. 073	4. 371	10. 648	. 164
37–38	4. 368	4. 368	3. 503	. 018	4. 369	7. 005	. 073	4. 372	10. 507	. 165
38–39	4. 369	4. 369	3. 456	. 019	4. 370	6. 911	. 074	4. 372	10. 366	. 167
39–40	4. 369	4. 370	3. 409	. 019	4. 371	6. 818	. 075	4. 373	10. 225	. 168
(36–40)	17. 473	17. 474	--------	--------	17. 479	--------	--------	17. 488	--------	--------

TABLE 6.—*Coordinates of intersections of meridians and parallels and lengths of meridians for each degree of latitude, in inches*—Continued

Latitude (°)	Length of central meridian	Meridian 1° from central meridian			Meridian 2° from central meridian			Meridian 3° from central meridian		
		Length of meridian	X (for lower latitude)	Y (for lower latitude)	Length of meridian	X (for lower latitude)	Y (for lower latitude)	Length of meridian	X (for lower latitude)	Y (for lower latitude)
40–41	4. 370	4. 371	3. 362	0. 019	4. 372	6. 724	0. 075	4. 374	10. 084	0. 170
41–42	4. 371	4. 371	3. 311	. 019	4. 373	6. 621	. 076	4. 374	9. 931	. 170
42–43	4. 372	4. 372	3. 260	. 019	4. 373	6. 519	. 076	4. 375	9. 778	. 171
43–44	4. 373	4. 373	3. 209	. 019	4. 374	6. 417	. 076	4. 376	9. 625	. 172
(40–44)	17. 486	17. 487	--------	--------	17. 492	--------	--------	17. 499	--------	--------
44–45	4. 374	4. 374	3. 158	. 019	4. 375	6. 315	. 077	4. 376	9. 471	. 172
45–46	4. 374	4. 375	3. 103	. 019	4. 376	6. 205	. 076	4. 377	9. 307	. 172
46–47	4. 375	4. 375	3. 048	. 019	4. 376	6. 095	. 076	4. 378	9. 142	. 172
47–48	4. 376	4. 376	2. 993	. 019	4. 377	5. 985	. 076	4. 379	8. 977	. 172
(44–48)	17. 499	17. 500	--------	--------	17. 504	--------	--------	17. 510	--------	--------
48–49	4. 377	4. 377	2. 938	. 019	4. 378	5. 876	. 076	4. 379	8. 812	. 171
49–50	4. 378	4. 378	2. 880	. 019	4. 379	5. 759	. 076	4. 380	8. 637	. 170
50–51	4. 378	4. 379	2. 821	. 019	4. 379	5. 641	. 075	4. 381	8. 461	. 169
51–52	4. 379	4. 379	2. 762	. 019	4. 380	5. 524	. 075	4. 382	8. 285	. 168
(48–52)	17. 512	17. 513	--------	--------	17. 516	--------	--------	17. 522	--------	--------
52–53	4. 380	4. 380	2. 704	. 019	4. 381	5. 407	. 074	4. 382	8. 110	. 167
53–54	4. 381	4. 381	2. 642	. 018	4. 382	5. 284	. 074	4. 383	7. 924	. 165
54–55	4. 382	4. 382	2. 580	. 018	4. 383	5. 160	. 073	4. 384	7. 738	. 164
55–56	4. 382	4. 383	2. 518	. 018	4. 383	5. 036	. 072	4. 384	7. 553	. 162
(52–56)	17. 525	17. 526	--------	--------	17. 529	--------	--------	17. 533	--------	--------
56–57	4. 383	4. 383	2. 456	. 018	4. 384	4. 912	. 071	4. 385	7. 367	. 160
57–58	4. 384	4. 384	2. 392	. 017	4. 385	4. 783	. 070	4. 386	7. 173	. 157
58–59	4. 385	4. 385	2. 327	. 017	4. 385	4. 653	. 069	4. 386	6. 978	. 155
59–60	4. 385	4. 386	2. 262	. 017	4. 386	4. 523	. 068	4. 387	6. 783	. 152
(56–60)	17. 537	17. 538	--------	--------	17. 540	--------	--------	17. 544	--------	--------
60	--------	--------	2. 197	. 017	--------	4. 393	. 066	--------	6. 589	. 149

INDEX

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